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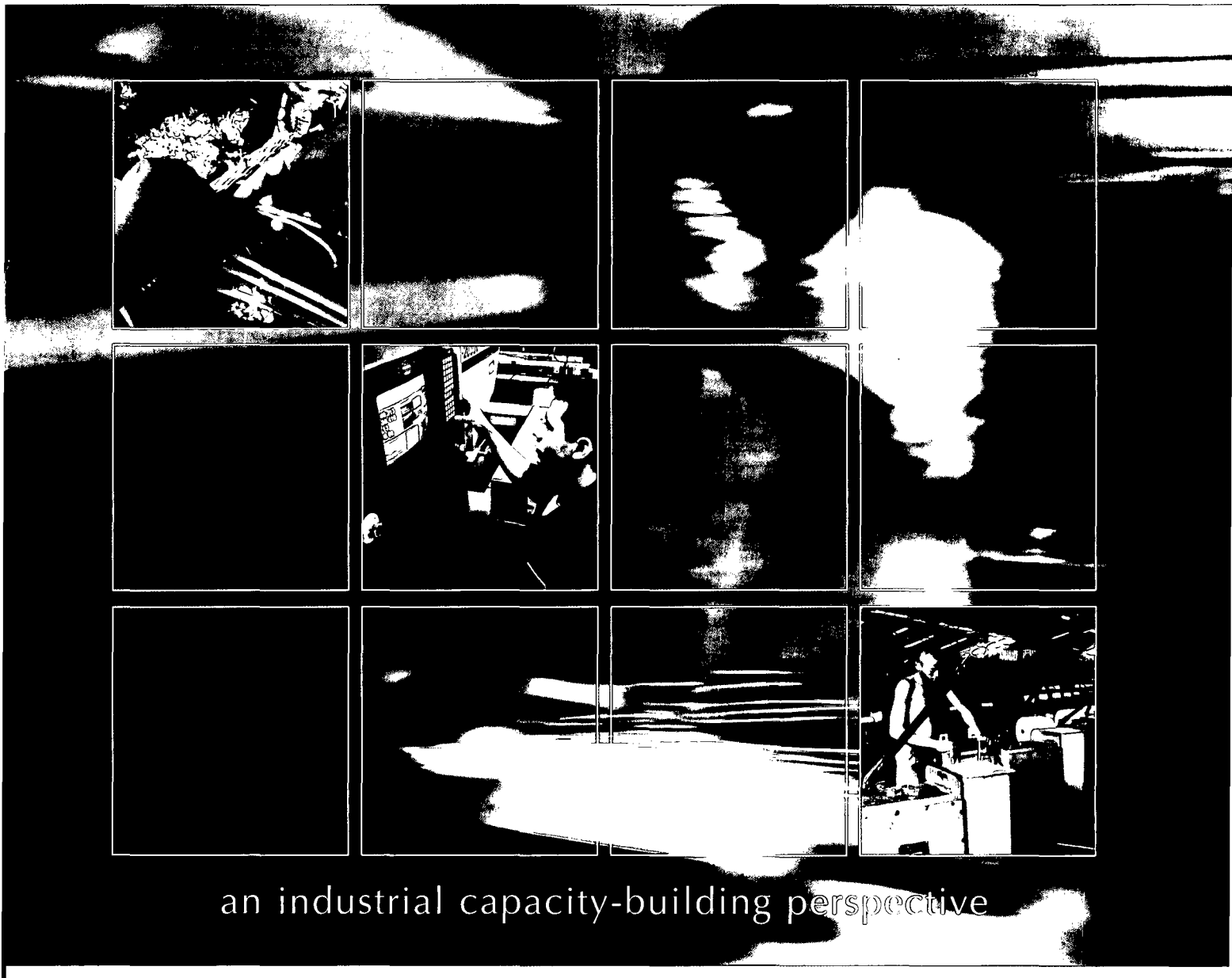
Developing Countries and Technology Cooperation



an industrial capacity-building perspective

United Nations Industrial Development Organization

World Business Council for Sustainable Development

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Vienna, 2002

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Foreword

UNIDO

Technology cooperation has always been at the heart of UNIDO's mission to help developing countries and economies in transition in their struggle against marginalization in today's globalized world.

In developing countries in particular, low intensities of applied technologies constrain dynamic investment and competitive industrial development. Inadequate skills, limited access to technical information, ineffective institutional and regulatory frameworks, as well as organizational rigidities impede technical change and innovation. Industrialized countries generate practically all the world's technologies and, while some developing countries are able to adopt and adapt some of these technologies to their needs, most of them are technologically marginalized. Sustainable industrial progress involves responding to this technological marginalization by applying technology transfer and management techniques at appropriate national, sectoral and enterprise levels.
The international agenda recognizes the importance of investment in technology for reducing poverty. UNIDO must rise to the challenge of addressing this and assisting developing countries accordingly and on a sustainable basis.

The private sector is a strong ally in UNIDO's mission on technology transfer, industrial partnerships and investment facilitation. I therefore particularly welcome the cooperation between the World Business Council on Sustainable Development and UNIDO, which has resulted in the publication of analyses of selected specific cases of business-led technology cooperation as a means of strengthening the technological capacities of developing countries. I look forward to continuing this valuable cooperation and to reinforcing the linkages between UNIDO and the member corporations of WBCSD to ensure sustainable technology and investment flows into developing countries to accelerate productive growth.

The analyses in this report reaffirm the reality of a generic, robust technology cooperation process that can be replicated and disseminated through capacity-building programmes, with necessary adaptations to local economies and cultures. A successful technology cooperation process includes elements such as needs assessment, clear national priorities for technology development, identification of appropriate forms of cooperation, an enabling environment and capacity building. Furthermore it is now widely accepted that official development assistance continues to play an important role in leveraging foreign direct investment and facilitating other forms of technology cooperation.

The World Summit on Sustainable Development in Johannesburg later this year will provide a most appropriate setting to mobilise political will and the necessary financial commitment to intensify the international community's efforts in the area of technology cooperation. UNIDO is prepared to demonstrate leadership in these efforts, drawing on its long-standing expertise and close networks of stakeholders.

Carlos Magariños
Director-General of UNIDO

Foreword

WBCSD

Technology cooperation is necessary to generate wealth and bring social progress in developing economies. We are pleased that UNIDO, in this joint case report, shared our interest to look at a broad spectrum of projects. These range from large scale projects, like a cement plant in China, to local farming in Brazil, Guatemala and Kenya, micro-enterprises in South Africa or photovoltaic electrification in remote rural areas of the Philippines.

We are also deeply grateful to our members who provided insight into the challenges they faced and the lessons they learned. Their experience brings the word cooperation truly alive.

While policy documents still coin it technology "transfer", this process only succeeds through a cooperation between provider and receiving communities. As evidenced in the following cases, technology is a key solution provider to sustainable development, but technological hardware is insufficient on its own. Software is equally important to build the local capacity be successfully exploit the technology. Companies who have invested time and efforts into these cooperative ventures have learned a lot in this process.

Yet, companies can devise all the technology they want, but if the institutional frameworks are lacking, technologies will never be utilized to their full potential, and to the full benefit of society. Well-functioning local governance, with a strong educational and technical fabric, is essential for successful technology dissemination.

More could be achieved by the allocation of public development assistance to build a local environment that is less risky and more predictable for private investors.

But business can be counted as a partner in cooperating in this effort.

Björn Stigson
President, World Business Council for Sustainable Development

executive summary

Technology transfer and cooperation allied to local capacity building make a clear difference in fostering sustainable development in developing countries.

This report provides an analysis of technology cooperation from the perspective of ten member companies of the WBCSD. Each case's contribution to developing industrial capabilities has been examined to identify results, benefits and key challenges and success factors. From this we provide several key recommendations to business and policy makers. For the business audience this study highlights specific considerations in undertaking technology co-operation with a developing country partner. For policy makers, the study highlights the need to reduce the impediments to Foreign Direct Investment (FDI) and successful technology cooperation, in particular the need to create greater synergies between Official Development Assistance (ODA) and FDI. For all readers, the study provides ten new examples of technology cooperation and insights into the way business is contributing to the creation of more sustainable livelihoods.

Methodology

The ten cases were selected from the WBCSD Case Study Collection to be researched and analyzed under a framework jointly designed by UNIDO and WBCSD. This report is based on the input of a large number of individuals – from the WBCSD companies, local companies and organizations, national and local governments, Intergovernmental Organizations and other key people involved in all the projects. However, it must be recognized that this study was compiled through the lens of the participating companies. While this is only one way in which technology transfer can occur these are business cases. They highlight the different roles business has to play and the contributions it can make to technology cooperation and strengthening the developing countries capacity for sustainable development. The cases all look at technology cooperation from the stage the project is launched. They do not look at any pre-project technology options evaluations.

BP Solar	Municipal Solar Infrastructure Project	Philippines
Suez (Lydec)	Low-income neighborhood electrification project	Morocco
Coca Cola	Entrepreneur development program	South Africa
Lafarge	Lafarge Duijangyan Cement Company – construction projects	China
CH2M HILL	Landfill site methane recovery projects	China
SC Johnson	Supply chain management –Pyrethrum Board of Kenya	Kenya
Bayer	Integrated Crop management projects	Brazil & Guatemala
DaimlerChrysler	Natural fiber project	South Africa
RMC	Joint venture company: RMC readymix-cement India	India
Alcoa	Alumar plant	Brazil

Key Findings and Recommendations

The creation of sustainable enterprises in developing countries is a vital tool for eliminating poverty and ensuring sustainable development. However, neither business nor governments can do this alone. Recipient governments, the private sector and civil society each contribute to achieving success.

Cooperation is essential – for new technologies to meet development objectives, the host country government and the business that can provide the technology must communicate intensely at the appropriate level and cooperate. The technology cooperation must also bring mutually beneficial outcomes to ensure the necessary long-term commitments from all parties.

On the policy and government side

Greater synergies between ODA and FDI must be created. Many of the challenges highlighted in this study translate into potential risks for the companies providing the technology. As long as these risks are present or perceived, it is less likely that firms will invest and engage in technology cooperation. A portion of ODA should be used to reduce these risks by building local technical and social capacity, better governance, accountability and administration. In this way it will improve the local business framework and foster technology cooperation, investment and enterprise creation.

Government spending within developing countries should also be directed to reduce private investment risks. This includes supporting capacity building, from basic education to specialist research and development capabilities, as well as supporting necessary infrastructure developments. In addition subsidies and taxes could be redirected to support technology development and sustainable enterprises.

On the business side

Acceptance and understanding must be generated at the local 'user' level. A future benefit and improved livelihood must be anticipated from the proposed technology. A fundamental first action is the provision of basic explanations, conveying the message of 'why' a technology should be adopted. Efforts devoted to explaining the technology and its potential benefits will enhance the initial acceptance of the technology as well as the presence of the implementing organization(s). It can also enhance the effectiveness of subsequent capacity building efforts.

Capacity building should be broadly inclusive and adaptable. Technology cooperation is rarely successful and sustainable without some form of capacity building. This study further highlighted however, that capacity-building efforts are made more effective when they are extended, adapted and localized. This includes the extension of education and training to other groups, such as community or school groups, and the inclusion of women and children; the methods and delivery of education and training must be adapted to local conditions and to the knowledge and skill levels of the trainees; and that this is best achieved by developing local trainers.

Pre and post project assessments enhance the likelihood of success and the ability to replicate technology cooperation in other countries. A detailed assessment of the people to be involved and their needs and capabilities must be conducted and existing infrastructure evaluated. This requires in some instances a detailed analysis of the needs and capacities of separate regions, communities and even individuals.

Dialogue and partnerships with stakeholders must be maintained for technology be accepted, diffused and adopted. This allows the firm to better understand all those impacted by the technology and better facilitates the necessary cooperation.

Effective communication and interaction is essential at all stages. Sensitivity to languages and dialects as well as cultural differences must be demonstrated for the cooperation to be successful.

Businesses must also seek to capture learning opportunities from each technology cooperation effort. While each new project will pose location specific considerations, knowledge and experience from previous projects, if captured and shared within the organization, increase the chance for future project's success.

In conclusion

The analysis of the ten cases did not reveal surprises or success factors that had escaped the notice of other experts in technology transfer and cooperation. All the factors listed above and detailed in this report have been covered extensively elsewhere.

This confirms the reality of a generic, robust technology cooperation model process that can be replicated and disseminated through capacity building programs that only need to be adapted to local economies and cultures.

It is not necessary to reinvent a good process project by project. An efficient program that deals with needs assessment, capacity building and cooperation guidelines will enable technology recipients and providers to work together and reduce the risks, misunderstandings, wasted efforts and disappointments. Such a program, with the support of ODA, will accelerate foreign direct investment into, and development within, the developing economies.

technology & development

Technology, for the purpose of this report will be defined as a system of knowledge, skills, expertise, and organization used to produce and utilize goods and services that satisfy social demand

Throughout human history technology has played an important role in shaping human society and development. Technological changes leading to mechanization and industrialization have led to much social change, and have often had significant consequences for human development. In some instances, technology has been a powerful tool for poverty reduction and improved standards of living.

Distribution of technology

While the Industrial Revolution and the many more recent technological developments have certainly brought about unprecedented changes in many people's material and physical well being, these benefits have not been evenly distributed across the globe. Therefore a great potential lies in the transfer of technologies to those areas that are still yet to benefit from such innovations and technological progress.

Developing countries are in a position to benefit from the lessons learned by developed countries and avoid repeating the mistakes of past technologies. These countries do not have to follow the same trajectory of technological progress as the developed world; rather, they can leapfrog to the newest, most productive and environmentally sound technologies available. It makes no sense to repeat the developed nations' failures during their 19th and 20th Century industrialization process. Investing in less energy- intensive, less material-intensive, and less polluting technologies makes economic, environmental and social sense. This however requires effective technology transfer and cooperation.

Technology transfer and cooperation for the purposes of this discussion is defined as the transmission of technology produced and/or used in one place for a given purpose to another place and/or for another purpose as a technological innovation. In an international context this refers to the transmission of technology (i.e., the entire system) from one country (technology supplier) to another (technology recipient).

For many people, especially those in the least developed nations of the world, these many new technologies are simply not accessible. They are often unaffordable, or inappropriate in certain forms. And in many instances a country may not be familiar with a new technology nor have the necessary capabilities to adopt this technology without a comprehensive effort of technology cooperation inclusive of technological and institutional capacity building.

Technical progress

Technical progress plays an important role in the economic development of a country. According to widely-accepted definitions, technical progress means technical changes in production equipment, production methods (techniques), and/or final products that generate positive economic effects.

Such technical progress is important for development for several reasons.

Quantitatively, it can speed up the rate economic growth as it provides for increased productivity and efficiency in using existing labor, capital and natural resources. Technological developments may also contribute to an increase in the scale of production that may ultimately accelerate the growth of a national economy.

Technological progress may be distinguished into two main forms - product and process innovations. A technology supplier can therefore enhance a company or country's technological capabilities by providing product or process innovations, or both. A product innovation may enable a country to manufacture new products or improve the quality of the existing ones. This in turn may lead to an overall upgrade in a country's technical abilities, potentially leading to the establishment of more competitive industries that can generate hard currency revenues for the country.

Technology cooperation

In the context of sustainable development, technology cooperation has been recognized as a key "means of implementation", for implementing the recommendations of Agenda 21. Several meetings of the Commission on Sustainable Development have adopted recommendations on technology transfer. The Special Session of the General Assembly for the 5-year-review of the Rio commitments in 1997 reiterated the importance of technology transfer. The Report of the Secretary-General for the preparatory process of the World Summit on Sustainable Development, Implementing Agenda 21, identifies technology transfer as one of the ten key areas in which progress is needed.

Technology cooperation requires longer-term partnerships in which all parties have a vested interest in successful continuing operation. It requires incorporating both the "hardware" technology components and the equally essential range of "software" components. Both components are necessary to ensure a continuing stream of economic benefits that accrue fairly to all partners. This includes process machinery and equipment, as well as patented and unpatented manufacturing techniques and production know-how. This can also include, more broadly, managerial, organizational, and marketing knowledge that contribute to the development of new skills.

This report has deliberately chosen to use the word cooperation rather than transfer in order to emphasize the importance of partnerships and longer-term commitment. For fifty years development assistance has suffered numerous technology transfer setbacks because the vital sustaining partnerships and longer-term commitments were absent.

Where technology transfer has been criticized as being a mere euphemism for the transfer of capital, the notion of technology cooperation encapsulates both physical transfer coupled with efforts to transfer knowledge and build capacity that is considered necessary for the adoption of new technologies in a developing country location.

Technology is at the core of competition and at the core of development. Where implemented correctly through technology cooperation it is proving to be an engine for improved environmental performance and poverty alleviation.

Capacity building

Technological "hardware" is insufficient on its own. "Software" is equally important to the successful diffusion of technology. For the development of industrial technological capabilities and economic growth it is vital that a transfer of knowledge and skills accompanies physical technologies.

Technological capacity building, the knowledge and skills that firms and individuals need in order to acquire, assimilate, use, maintain, adapt, change and create technology, is an essential dimension of the technology cooperation process. Technologies will only be fully exploited if the knowledge of how to put them to use is widely disseminated and applied.

Even the best, most environmentally sound hardware can have a negative impact if misused or mismanaged, or if not supported by the appropriate resources, institutions and infrastructure. A failure to transfer the required skills and knowledge can result in operational failures, poor quality production, and compromised safety standards. In addition, there can be adverse impacts on the natural environmental and surrounding populations – often in a manner that severely affects the livelihoods of these people.

The responsibility for capacity building lies with both the companies transferring technologies to developing countries as well as those developing country governments at both local and national levels. It is important that capacity building takes place at different levels for the success of individual business and projects as well for the development of industrial capabilities at the host country level.

Project Specific Capacity Building

For specific technology transfer projects it is vital that capacity building is an interwoven component of the project's design. In this respect, technology transfer efforts are most effective when developed in a cooperative manner - technological progress does not result from a simple hand me down process. This process of knowledge creation and

capacity building requires a targeted education and training effort. This will ensure that those involved develop the skills needed to understand, utilize, and replicate a technology. The responsibility for this lies with those organizations directly involved in the project. In this instance, for the technology transfer to be sustainable, it is the company (or companies) driving the technology cooperation that need to ensure capacity building efforts are delivered and effectively targeted.

This can range from the transfer of new skills to the upgrading of existing skills. Where new hardware requires maintenance and repair skills not possessed by the recipient organization, group or region then it will be necessary to train people in these new skills. In other instances, the introduction of a new technique or hardware may require the upgrade of existing skills to ensure that the true potential of the technology is realized.

For specific projects, it may also be necessary to address the very basic level of skills of people in the organization or region where the project is being delivered. Low literacy rates for example may place additional demands on the capacity building components of a project. A business seeking to transfer technology may need to adapt the delivery of the project where recipients of the technology are unable to read and write. It can be argued that such issues are the responsibility of a developing country's government. However, individual projects must not overlook such basic skill deficiencies as being out the scope of their consideration as this may negatively impact of the overall success of a project.

Further, institutional capacity building efforts may also become a consideration of a specific project. In an ideal world, networks for cooperation and knowledge diffusion would exist to support all technology cooperation projects, and adequate governance structures would be effectively in place at all levels. This is however, not often the case. In particular, in the Least Developed Countries (LDCs) this is often a major deficiency that individual projects will need to address. R & D networks may be poorly linked or even non-existent, and cooperation between local government, NGO's, the private sector, and the community may in fact be very poor. All this can present impediments to technological progress and development.

Government supported capacity building

Local and national governments in developing countries also have a very important role to play in capacity building. This includes developing all levels of education provisions and the capabilities of national and regional research and development groups, as well as strengthening institutional capabilities at all levels.

The availability of adequate human capital can be a driving force behind the choice to undertake technology investments in a country. Where basic literacy skills are low and education levels very poor, the ability to attract investments and integrate new technologies and technical capabilities can be considerably challenging; government support for developing the technological competence is clearly vital.

The investments made in education and training, at all levels, determines the conditions for technology cooperation, as this determines the skills and knowledge foundation available for technology cooperation efforts. Basic education is vital for raising literacy levels and basic abilities for a workforce, and advanced education contributes to the quality and quantity of managers and professionals available.

Investments in R&D are also a vital part of capacity building, and can transform knowledge into a critical factor of production. This can contribute both to the success of any single technology transfer as well as to the recipient country's ability to innovate. For technology to be a tool for human development purposive effort and public investment are required to create and diffuse innovations widely.

Governments are also responsible for institutional capacity building as this also contributes to the strengthening of foundations for technology cooperation. Local, regional and national governments, especially in LDCs need to enhance their institutional capacities, with respect to activities such as collecting information, effectively planning of expenditure, delivering public services, fighting corruption, and protecting property rights.

In addition, intergovernmental organizations play a vital role in capacity building efforts, both at an individual project level, as well as on an ongoing basis, often at a sectoral or regional level.

Modes of transfer

Technology cooperation can take many different forms. These range from highly structured, formal technology transfer contracts to less formal types of cooperative agreements. Types of agreements include: patent; know-how; trademark; franchise; distribution; copyright; computer software; technical services and assistance; engineering services; and management services.

These agreements vary in the type and level of capacity building assistance that is provided. A pure patent license for example, may provide no technical

assistance, know-how, or intellectual property rights, whereas other agreements may center on the provision of technical assistance and knowledge transfer. In addition, hybrid agreements are often formed based on one or more intellectual property. This can combine, for example, a patent and know-how.

Financing technology development

There are several types of international investment flows which can support technology cooperation, including:

- Foreign Direct Investment (FDI). This involves direct investment in physical plant and equipment by business interests.
- Official Development Assistance (ODA). This includes grants and interest free or subsidized loans for various purposes to developing countries primarily from member countries of the Organization for Economic Cooperation and Development (OECD).
- Loans. These include loans from either International institutions or from commercial banks.
- Portfolio Investment. This involves purchase of stock or shares of local companies directly or through investment funds.

Of all foreign capital flows to developing countries, over the past decade, only FDI steadily increased (from USD 200 billion in 1990 to USD 1.3 trillion by the end of the 1990s). Other forms of private capital flows, mostly in the form of portfolio investments and bank lending, experienced fluctuations and high volatility over the same period.

While FDI does offer an attractive medium for transfer, the reality is that many developing nations have thus far failed to benefit from FDI, technology transfer and increased international trade. The reason for this is that FDI predominantly occurs in a limited number of newly industrialized countries.

The bulk of foreign finance goes to a few newly industrializing economies, whereas most middle and especially lower-income countries experience difficulties in attracting sizable external investment. Beyond the newly industrializing economies that attract most foreign investment, particularly middle-income countries could attract additional private investment.

Limited ODA, unsustainable levels of budget deficits and external debts, and the need to maintain fiscal discipline to control inflation and spur economic growth, make it imperative to mobilize domestic and international capital sources to finance developing countries. Creating a business-friendly environment by removing the multiple obstacles to efficient private sector activity and investment is the key to private sector investment.

A special challenge remaining is the mobilization of financing for development to those countries that most desperately need it. Yet, it will be more difficult to channel foreign private capital flows into LDCs, even if local investment framework conditions improve over time. This is particularly true for countries in South Asia, Central Asia and Sub-Saharan Africa with scarce natural resources, small markets, poorly qualified labor and little infrastructure. ODA provides an effective tool for financing development that may in turn leverage private investment in those LDCs with few opportunities to otherwise attract foreign financing.

The importance of the private sector has increased considerably. However a definite role exists for governments to provide enabling environments for technology transfers.

Particular emphasis should be put on business development that involves building up infrastructure, wealth-generating capacity and competitiveness of a country.

Presented here are summaries of the ten case studies that were researched and analyzed for this report. Here we provide an overview of each project, with key outcomes highlighted.

The full versions of each case study can be found in volume II of the report

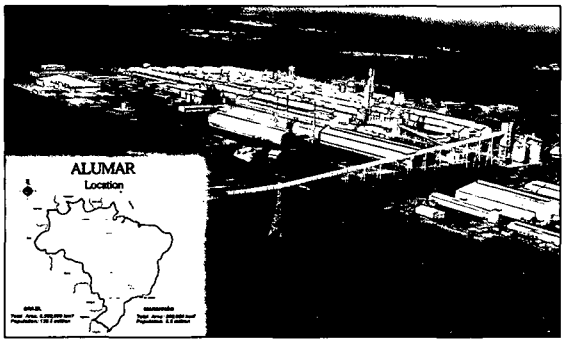
Alcoa: The Alumar refinery and smelter – Brazil

Alcoa Aluminio in Brazil operates the largest Alumina refinery in South America and the second largest smelter on that continent. The Alumar plant, one of Alcoa's most modern smelters and refineries, is situated in Sao Luis, in Northern Brazil.

Alcoa's values, training and financial support were made available to Alumar in the early stages of development, along with technical assistance and experienced workers. Due to the lack of industrial background in the region there very few specialized workers available initially; this was in fact the first heavy industry of its type in the area. During this stage Alcoa's plant in Poços de Caldas supplied several staff to run the plant, and several technicians came from the USA to conduct and teach operational activities. Several technicians hired by Alumar in São Luís were also sent to other plants for training.

Over time the company developed extensive training programs that have enabled local people to form a dedicated, high performance workforce. Depending on their position, they received anything from an introductory course on safety and legal procedures, through to a complete College education. Career plans were developed to determine the appropriate training for each individual. This was a win-win for the employees, the company and the region - more skilled employees meant enhanced and more competitive outputs and consequently an improvement in the local industrial capability.

Great improvements have been recognized in the quality of the operations over time. Training and development programs have led to a highly skilled and qualified workforce. In particular, employees have been noted for developing a strong commitment to policies, cost awareness and a sense of ownership, as well as improved group work and responsibility for self-development. As a result of process efficiency and high management standards, Alumar was awarded both ISO 9002 and 14001 certifications by July 2000.



A labor force of about 13,000 people was employed at the peak of construction. More than 80% of those workers came from Maranhão. Since the commencement of operations, Alumar has become an important regional economic center, offering more than 1,950 direct jobs and another 1,500 indirect jobs. Currently more than 98% of the employees come from the local region, even in the managing seats. Alumar also work closely with Local and Federal Colleges and Research Institutes. Partnerships with vocational institutes, colleges and universities have given many students a chance to enhance their education and apply their knowledge in a practical environment through internships. Alumar is also sponsoring community programs in environmental education.

Alumar is now recognized worldwide as one of the world's largest industrial complexes for production of alumina and aluminum. In the refinery the present production rate is around 1.27 million tonnes per year of alumina, and in the smelter the current capacity is 365,000 tonnes per year of metal. To support the 'heavy industry' a medium-heavy industry has developed in the region, mainly focused on fabrication workshops and industrial gas production. Due to the large amount of goods transaction within the São Luís area, dozens of local industries have developed since Alumar installation.

Project Type:	construction and start up of Aluminum smelter and refinery
Project Cost:	Capital invested in plant US$ 1,7 billion
Drivers:	Growing aluminum demand in Brazil; third largest bauxite reserves; aluminum importation substitution and exportation of the surplus production; Federal Governmental Program to stimulate industry growth in this region.
Financing:	The Refinery is owned by a consortium of Alcoa Aluminio do Brasil S.A (35.1%), Billiton Metals S.A (36%), Alcan S.A (10%) and Abalco S.A (18.9%). The Smelter is owned by Alcoa Aluminio do Brasil S.A (53.66%) and Billiton Metals S.A (46.34%).
Employment:	Construction: 13,000 jobs. Operations: 1,950 direct jobs, 1,500 of indirect jobs. >98% from local region.
Training:	Training and career development offered to all employees, based on Alcoa Business System (ABS).
Capacity Building:	partnerships with vocational institutes, colleges and universities
Economic Impact	Raw materials: US$ 186 million; Payroll Charges/Salaries/benefits: US$ 59 million;
Local suppliers:	US$ 60 million. Taxes paid: State: US$ 22 million; Municipal: US$ 2,8 million (Alumar s the largest taxpayer in the State)
Trade:	20% alumina and aluminum sold to domestic market, 80% to the international market.
Flow on business impacts:	medium-heavy industry developed in the region, plus support services
Standards:	Alumar was awarded both ISO 9002 and 14001 Certifications by July 2000.

Bayer CropScience: Integrated Crop Management projects Brazil & Guatemala

German company Bayer CropScience developed an Integrated Crop Management (ICM) training program for farming families in Latin America. The pilot project began in Brazil in May 1995 and in June 2001 it lead into a Public-Private Partnership Project in Guatemala with Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), a German government owned corporation for international co-operation.

The overall campaign was based on the basic concepts of Integrated Crop Management (ICM), which includes the protection of natural resources and the conservation of biodiversity as well as Integrated Pest Management (IPM). For these projects, special attention was given to Integrated Pest Management (IPM), which includes indirect measures of weed, pest, and disease prevention such as crop rotation and monitoring pest populations against threshold levels; it uses direct control through biological, biotechnological, mechanical, and chemical measures. Under this system, the use of crop protection products is defined by targeted and optimized use, and adapted to local environmental and economic conditions. The correct and efficient handling of crop protection products was also an important aspect of the project.

Participatory training approaches in communities, with an emphasis on all family members and especially women and children, formed the cornerstones of this campaign; children were actively involved in the campaign as they were important communicators in regions where they often received more education than their parents.

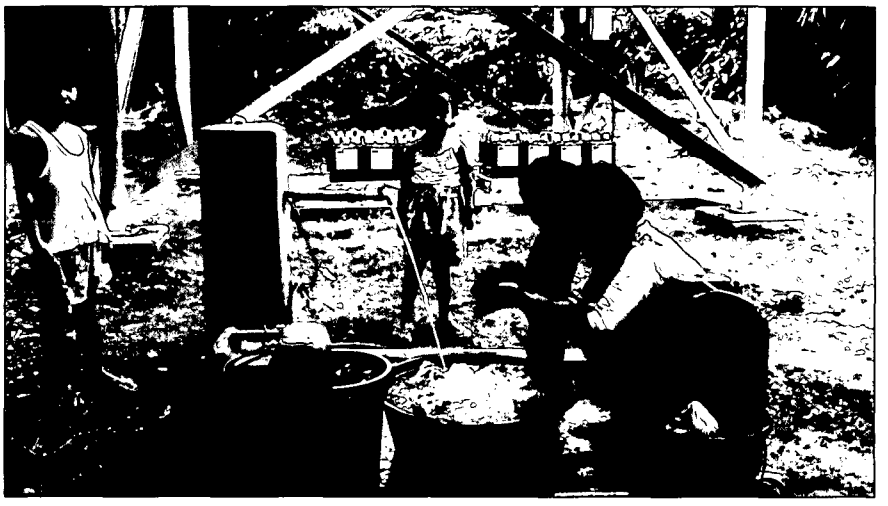
A mix of communication tools was used for conveying the ICM and IPM messages. These included the use of demonstration plots, radio programs and a "lead farmer" approach. Special attention was also given to finding appropriate methods for conveying information to the many beneficiaries that could not read or write. Visual materials such as films, educational-comic strips, card games and posters containing pictograms were among the most effective tools used.

In Brazil, 25,000 small-scale farming families were reached between 1995 and 2000, including 1,300 teachers and 2,500 children. Positive results were recognised in relation to crop and pest management aspects, such as crop rotation and conservation tillage, the value of beneficial organisms and the safe and effective use of crop protection products.

In Guatemala about 3,000 people have attended the training sessions in the first 6 months. New cultivation techniques are improving practices, and it is hoped they will contribute to increased yields and more sustainable livelihoods of farmers as the project progresses. To date, positive results have already been achieved in peanut production, where yields and earnings tripled. This project includes a broader focus – including, for example, crop diversification and market development for agricultural produce - that could only be successfully conducted through burden sharing via the public-private partnership approach adopted. The program in Guatemala is also aiming to conserve biodiversity through the avoidance of unsustainable expansion activities by farmers who often leave their unproductive land in search of "new lands" for agricultural purposes in tropical rain forest area.

Project type:	Agricultural training, know-how and technical assistance.
Financing Project:	Bayer financially supported the pilot project and both Bayer and GTZ financed the Guatemala project. In kind support from partner organizations including providing specialists to train the local trainers.
Motivations:	The ICM/IPM campaign emerged from the company's commitment in 1995 to ICM. The project was also set up to help the company develop and improve new training activities.
Other institutions/ partners involved:	Partner for Guatemala project:: German service company: Gesellschaft für Technische Zusammenarbeit; Local authorities including health, education, and agriculture departments; farmers' association (AFUBRA); industry group (SINDIFUMO); and agricultural workers trade union.
Reach:	Brazil, 25,000 small-scale farming families; 70 local trainers. Guatemala, 917 growers, 2610 pupils; 40 external trainers.
Economic progress:	peanut production yields: net earnings tripled.

BP Solar: The Municipal Solar Infrastructure Project – Philippines



BP Solar has provided solar energy and upgraded basic facilities in remote un-electrified communities in the Philippines through the Municipal Solar Infrastructure Project (MSIP). Solar energy was the source of electrical power for all systems provided, bringing the advantages of very low operating costs, high reliability, and suitability for operation in isolated communities. The project included delivery of the solar systems as well as energy related infrastructure such as lighting facilities, vaccine fridges, school equipment, and water pumps.

Social preparation, training, and community development programs were major components of this project. The social preparation phase was an essential first step, whereby BP explained the new technology to each village. This included explaining the maintenance commitments and payment programs that would be required.

BP trained 150 community development officers at the start of the project, and during the implementation phase many local community members and local businesses were trained to manage the systems over time. Two people in each community were trained on simple maintenance of the systems. Municipal Engineers and operatives were then trained on the more technical repairs and maintenance of the system components. Advanced training was also provided to the Universities to enable them to fully dismantle, repair and reassemble the components. In total, more than 2,250 villagers were trained under this program. Spare parts were also distributed to the municipality so that the communities could have easy access to replacement parts.

The community development program included assistance with managing the energy services and developing revenue-generating activities. In each village ad-hoc committees were formed - a health committee, school committee, and water committee. BP trained individuals to run these committees, manage budgets and conducting meetings. BP also spent time with each village, exploring revenue-generating opportunities that would enable them to pay for the services provided by the solar systems. They explored activities such as growing onion bulbs, animal breeding, and basket weaving. These activities would cover the service costs of receiving the benefits of the solar energy - such clean water supplied from solar energy powered water pumps. These revenues were also required to fund maintenance and parts replacement, as well as upkeep of the service systems (such as light bulbs for the lighting systems). This money could also be allocated to upgrading products and services, such as the purchase of new videos to play on solar powered televisions and videos.

This rural development project has provided health, education and governance benefits to more than 500,000 poor Filipinos in 11 Provinces, 53 Municipalities and 435 villages in the Mindanao and Visayas regions. This includes energy provisions to district hospitals and health centers, municipal and village halls and schools, as well as potable water supply systems and lighting for markets and fishermen's wharves in communal areas. In particular, women and children in these communities have benefited greatly through new and improved education opportunities and better health facilities.

Project:	Rural solar electrification
Duration:	MSIP commenced in November 1997 and was completed in May 2001
Drivers:	Philippine government
Location	Mindanao and the Visayas Provinces, Philippines
Cost:	US$27 million
Funding:	ODA: Soft loan incorporating 35 percent grant from the Australian Government
Training:	2,250 villagers trained
Reach:	1,145 packaged solar systems to benefit 500,000 poor Filipinos in 435 villages
Impact:	positive health and education impact on women and children

DaimlerChrysler: Sisal Fiber Project - South Africa

DaimlerChrysler have undertaken a project to transfer technology for the manufacture of vehicle components from natural fibers from Germany to South Africa. The objectives of the project were to set up an entire process chain based on the use of sisal fibers. This included the farming of sisal, processing of the fibers, manufacture of the components, and the release to the Mercedes-Benz Plant of Daimler Chrysler South Africa.

The technology came from German firm, Johann Borgers GmbH & Co. KG (Borgers), who were already experienced in natural fiber component production. The technology recipients were two local South African firms, Brits Textiles & NCI. In addition, DaimlerChrysler has worked with the Council for Scientific and Industrial Research to improve the entire process supply chain, including the natural fiber production at sisal farms.

Brits Textiles signed a technology agreement with Borgers to receive technology for the manufacture of molded parts produced from natural fibers for the automotive industry. Brits Textiles made a one-time payment of U.S. $80,000 for this technology. Borgers' role included prescribing recipes suitable for the components involved; recommending raw material suppliers, assisting with plant sourcing and layout, and providing on-going technical and quality assistance. Also included was an exchange of personnel, including a technical team to help set up the production line.

Through an existing technology agreement between Borgers and NCI, Borgers provided assistance to NCI with the design and development of the lamination, trimming and assembly process. Under this agreement NCI pay a royalty of 2% on revenue generated to Borgers to retain their technological support.

The first sisal component was released for inclusion in the Mercedes-Benz C-Class vehicle in October of 2001. The sisal - cotton mixture from the local manufactures now makes up 75 percent of the material in the Mercedes Benz C Class's rear shelf. The two local firms have benefited from this technology transfer in that they are now successfully processing the fibers and producing the components to the required standards for the Mercedes vehicles.

Two avenues now exist for additional business for the two South African firms. Additional uses for the natural fiber have been identified, thus presenting additional opportunities for these firms to expand their production. Further, a number of other automobile manufacturing firms have begun using natural fiber components, and the customer base for the two South African businesses is continuing to grow.

In 2000, South Africa exported 100 000 vehicles, five years ago it exported none; a mirror of the change has taken place in South Africa's automotive sector. The challenge for the industry now is to enhance its competitiveness and continue introducing new environment-friendly materials like sisal into the component of automobiles.

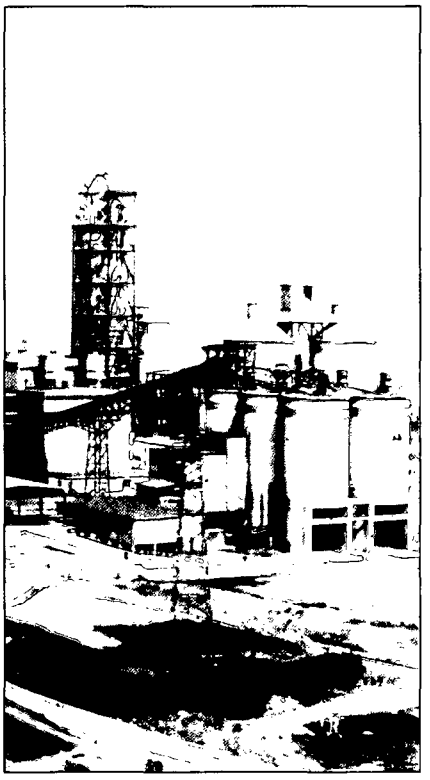
Project Type:	Technical assistance, licensing and supply chain research and management
Technology recipients:	Brits Textiles and NCI
Partner organizations:	DaimlerChrysler AG, Johann Borgers GmbH & C; The Council for Scientific and Industrial Research (CSIR)
License cost:	One-time payment of U.S. $80,000 for processing and manufacture technology (Brits)
	Technology agreement with NCI – 2% royalty
Drivers:	DaimlerChrysler driven effort to maximize local content in vehicles; preference for natural fibers; and success of DaimlerChrysler's pilot project in Brazil (POEMA)
Status of project:	Technology transferred to 2 SA firms; production commenced October 2001 – 220 component per day
Flow on effects:	New uses for sisal developed – new components; and new customers for technology recipient firms
Employment:	30 new jobs for processing and manufacturing; stabilization of jobs in farms

Lafarge: Lafarge DuJiangYan Cement Company - China

French company Lafarge entered a joint venture agreement with DuJiangYan Building Materials Corporation to form the Lafarge Duijangyan Cement Company. Under this joint venture agreement, a new cement plant has been constructed in ChengDu, in the Sichuan Province of southwest China. The specific objectives of this project were to construct a new plant with state-of-the-art dry process technology, a new quarry and a railway for transporting materials.

While divided into three separate turnkey projects, the company's objective was for each to be built according to Lafarge quality, environment and safety standards. This was of particular importance in the construction phase as large-scale automation, strict safety requirements, high environment standards, and certain management styles were essentially new to the Chinese cement industry. In addition, the construction partners had a tendency to adopt rigid hierarchical management structures that meant decision-making was often inflexible and non-inclusive. They were also not used to compiling regular written reports As part of this project, a more open structure was adopted to encourage information sharing at all levels, and a commitment to targets and quality standards was made by all parties.

Lafarge best practices were transferred during the construction phase of each project, in particular those relating to safety and environmental practices. The Lafarge team worked with the design and construction firm's management teams to transfer skills and capabilities in manufacturing, installation and project management. Specifically, implementation of a Technical Assistance Agreement that saw Lafarge provide managerial and technical expertise, reporting procedures, comparative data, training and advising capabilities to the joint venture company. Intensive training programs were carried out to ensure that all personnel were adequately informed and equipped with appropriate skills to manage and operate the plant in accordance with Lafarge's policies.



For many this was the first time they had collaborated with an international company and the first time they had worked with such a large-scale project and equipment. As a result of this project, local construction capabilities have been developed that will contribute to ongoing regional economic development, particularly that related to new process technologies, environmental protection and high grade products.

The plant, now in operation, has an annual production capacity of 1.4 million tonnes of high performance cement. Over 80 percent of the plant's production equipment was sourced locally and local firms were contracted for construction. The plant is equipped with the worlds most advanced technologies, and is noted for its environmental friendliness, fuel and electricity efficiency and high quality. Currently the plant and the associated quarry employ 350 people; mostly recruited locally in China.

Project:	Construction of new plant with state-of-the-art dry process technology, a new quarry and a railway for transporting materials.
Structure: Materials	Joint venture between Lafarge and DuJiangYan Building Corporation
	Technical Assistance Agreement between Lafarge and joint venture company
	Turnkey project with 3 Chinese design/construction firms.
Cost:	US$158.8 million
Structure of financing:	Lafarge: US$ 77.4 million
Chinese partner:	US$ 25.8 million
Equity loans (IFC):	US$ 55.6 million
Drivers:	Strategy of establishing a substantial and profitable position in carefully selected regional markets. Increasing level of demand for high quality cement in ChengDu region – result of accelerated infrastructure development program
Partners:	Chengdu Design Institute; China Building Materials Industry Corporation (CBMI),
	Sichuan Railway Bureau; China Building Material Tangshan Corp
Input material:	90% of the mechanical equipment and 75% of the electrical equipment used for construction sourced from China
Employment:	Plant and the associated quarry employ 338 people

SC Johnson: Pyrethrum Sourcing from Kenya

Project:	Supply chain capacity building and technical assistance program
Drivers:	Effort to secure high quality raw material supply to avoid use of synthetic alternatives
Training/ assistance:	Planning and forecasting; plant husbandry; customer service; bio-efficacy testing.
Status:	PBK recognized SC Johnson "Partner in Quality"
Employment:	300,000 jobs industry wide; 680 jobs with PBK
Economic Impacts:	Industry level: US$25 million in export sales value to Kenya
Regional level:	3% of profits going to payment for infrastructure
Farmer level:	900,000 Kenyans gaining access to monetized economy through pyrethrum
Social Impacts:	Industry stabilization is funding schooling for more than 300,00 children
Environmental Impacts:	Perennial rotation crop helps maintain soil in 17,600 to 32,000 hectares on Kenyan highlands; little chemical, fossil fuel, fertilizers or herbicides are necessary; pyrethrum crop does not require irrigation. Relies on natural rainfall.

Flowers, grown by subsistence farmers in the highlands of Kenya are the key active ingredient for value-added products found in households around the world. Pyrethrum, a unique daisy, is the source for a naturally occurring insecticide that degrades quickly back into the earth. Over the past 30 years, U.S. company SC Johnson has become one of the biggest single end users of natural pyrethrins, for RAIDTM household insecticide products

The Pyrethrum Board of Kenya (PBK), a parastatal agency that controls and operates the entire pyrethrum business in Kenya, manages the country's total supply of pyrethrum through a network of farmer cooperatives. SC Johnson has worked directly with PBK since 1970. This relationship has extended considerably beyond that of a normal supplier-purchaser relationship, characterized increasingly by a strong degree of knowledge and technology exchange.

In the early days there was a focus on exchanging skills and knowledge pertaining to crop husbandry and education and training. The focus of the efforts shifted however in the last ten years, predominantly as a result of shortages experienced, as well as the increasing competitiveness of synthetic pyrethroids.

Initially SC Johnson was sourcing primarily natural pyrethrins; however during the early 1980's, as a result of the supply shortage of pyrethrum, SC Johnson turned to synthetic pyrethroids, which had improved in quality, become less costly, and maintained consistently adequate supply levels. A supplier was identified in Japan, which provided very high levels of customer service, efficiency and professionalism that made them an appealing supplier. However, the company maintained a preference for using natural pyrethrins and felt strongly about maintaining the relationship established with PBK. The challenge then was to help PBK to reach higher standards as a supplier. Among the issues of greatest importance was PBK's ability to provide a reliable, consistent supply level of pyrethrum. SC Johnson introduced its Quality Assurance Audit to PBK in 1995 and at this time their processes were significantly below established criteria to be considered an SC Johnson "Partner in Quality." Efforts were then directed at helping PBK reach this global standard.

SC Johnson has helped PBK develop planning and forecasting abilities through sharing of best practice examples and on-going advice regarding establishment and maintenance of a safety stock to help offset harvest shortages. SC Johnson has also provided technical assistance to PBK. The company has provided bio-efficacy testing protocols and tools to allow for a better comparison of results between products tested at PBK in Kenya and at the SC Johnson in the US. In addition, SC Johnson has also collaborated in the development of up to date analytical chemistry methods that have aided in the identification of new and different pyrethrum extracts.

As a result of this long-term capacity building effort, there has been a notable improvement in product quality and a rise in production standards. PBK have made continuous improvements in their quality control programs, and they have passed supplier audits from SC Johnson as well as by European buyer Aventis. Standards continue to rise and PBK is now seeking ISO certification.

Lydec (Suez): Providing access to electricity for low-income neighborhoods - Morocco

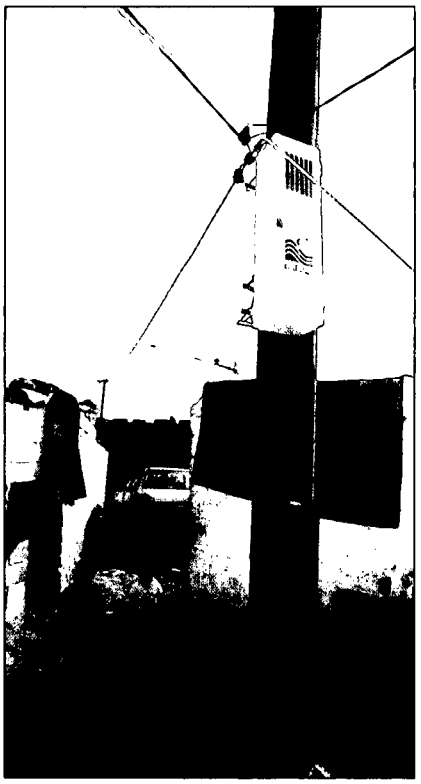
In 1997 Casablanca-based Lydec, a branch of the worldwide energy, water and waste services group, Suez, was charged by the Urban Community of Casablanca with managing the Casablanca electricity, water and sewage networks. In Casablanca, more than 400,000 people live in slums, with no access to electricity and minimal access to water and sanitation.

The first stage of this project, which commenced in 1998, gave priority to electrification of low-income neighborhoods. This was based on a needs analysis, as well as the need to eliminate the major risks associated with the illegal connections being made through existing electricity networks.

The provision of electricity to Casablanca's shantytowns was based on a system of extending the main electricity grid via temporary connections, on a street-by-street basis, to serve each house in the street. Cost-effective technologies were put in place and an appropriate tariff structure was defined in close relationship with local communities, neighborhood organizations and municipalities.
The structure of the project is such that primary networks were established by sub-contracted local enterprises. Private electricians then set up the individual street networks that connected each house. An elected street representative was then made responsible for managing the connection and electricity supply once established. On average, each neighborhood association became responsible for the street electricity supply for 20 houses, as well as services ranging from technical management to bill collection. The investments were shared between Lydec and the inhabitants who pay US$130 per connection for access to service.

Lydec provided materials and technical assistance to ensure standardization and the effective management of the supply networks over time. The company offered training to both the electricians and the representatives from each street. Electricians were trained in how to establish connections to the grid and provided with the necessary equipment to do so. Street representatives were trained in managing the electricity supply once established. This included identifying problems with electricity supply, reading electricity supply meters and collecting monies owed from each household. They were provided with a basic training in electricity and safety, and with the work tools necessary for their activities.

So far, approximately 110,000 people have benefited from this program in 40 districts. Work is on progress for an additional 100,000 people spread over 45 districts. The innovative financial scheme that was designed provides a sustainable economic system, based on the inhabitant's economical reality and allowing flexibility. The project has created ongoing employment for approximately 200 people, and the introduction of energy has also facilitated the creation of SMEs. In addition, the new energy technologies introduced are helping to avoid the use of more polluting traditional energy sources, such as gas and small generating motors, thus reducing the negative impacts on health and the environment. In addition, illegal connections have significantly decreased, therefore reducing the risk of minor and fatal accidents.
This approach will be replicated for water and sanitation, with pilot projects planned for 2002.



Project type:	Electrification and local capacity building to shantytowns in Casablanca	
Funding:	Management contract; community labor exchange	
Reach:	Electrification of 17,000 households (110,000 people)	
Training:	Technical and managerial/governance capacity building at neighborhood level	
Financials:	Global intended investment cost (30,000 households)	US$6.6 million
	Achieved investment	US$3.3 million
	Expected annual turnover in 2002	US$2 million
	Reduction of energy costs for client/community	US$2.5 to 4.2 million p/yr
Jobs created:	600 for set up and maintenance	

Coca-Cola: The Entrepreneur Development Program – South Africa

Coca Cola's Southern Africa division, in conjunction with local bottling companies, have developed the Entrepreneur Development Program in South Africa to help new entrepreneurs enter the supply chain and profit from new sustainable business ventures.

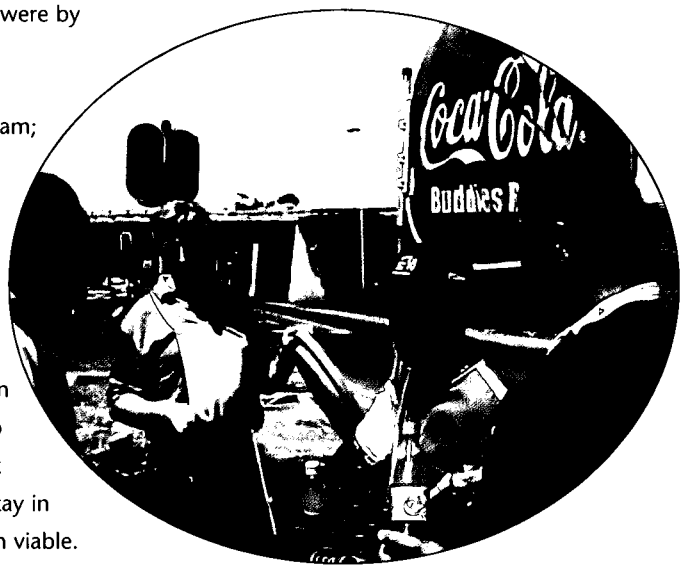
The program specifically targets micro entrepreneurs in undeveloped markets who can enter the Coca Cola value chain to generate income and profits for themselves. The program engages new entrepreneurs who demonstrate an interest in business and display potential capabilities and commitment. In addition, existing outlets that demonstrate the capability and capacity for growth are also included.

Once selected, the entrepreneurs are introduced to the Coca Cola system and how it operates. They are provided with targeted support and training in basic business skills. This includes training in pricing, stocking, forecasting, legal requirements, sales, and customer relations, marketing and advertising. The new entrepreneurs then enter into a business arrangement that makes it easier for them to access capital equipment – such as trolleys and coolers and they are provided with start up stock.

Monitoring mechanisms, based on an evaluation of individual sales and profit levels, have also introduced to monitor the effectiveness of each entrepreneur. When an entrepreneur demonstrated improvements they are reviewed for an upgrade in their business and equipment. In addition, the Coca-Cola bottlers have also developed a number of creative innovations to meet the needs of these developing entrepreneurs. These include for example, sturdy transport bicycles, mobile mini kiosks, and mobile coolers for street vending.

The program was initially fully funded by each bottling company and Coca Cola Southern Africa. Recently however, an agreement with the South African government has enabled a redirection of funding to support the program. Under an agreement with South African Soft Drinks Manufacturers – of which Coca Cola is a major player - the South African Government has reduced excise tax on sugar. In exchange, Coca Coal are redirecting part of this saving to fund micro-enterprise development

In total, over 7,000 people have been trained under this program. In 2000 Coca Cola created 5,000 new outlets and 3,500 of these were by participants in the Entrepreneur Development Program; this resulted in the creation of 12,900 jobs in the Coca Cola system. In 2001 just over 3000 new outlets were created, and in 2002 the focus is to be on ensuring that these continue to stay in business and remain viable.



The majority of new jobs are created in the informal sector, which accounts for 60% of sales volume. This is an important aspect of development in South Africa as many micro-enterprises serve as a safety net at times when the formal sector struggles - as has been the case in South Africa in recent years. The opportunities presented by the entrepreneur development program are therefore promoting a sustainable means of economic support and poverty reduction. The success to date of the Entrepreneur Development Program highlights the importance of how trade, not just production, can create jobs and boost market development. This downstream distribution and capacity building has been vital to market development in South Africa.

Project type:	Micro - entrepreneur capacity building
Drivers:	New market opportunities; objective to increase sustainability of retail outlets
Funding:	Company funded initially; now supported in part through excise tax reduction benefits
	Excise reductions: 1999 US$ 1.1mil, 2000 US$6.8 mil, 2001 US$3.2 mil, 2002 US$11.8 mil
Training:	7,000 people trained in pricing, stocking, forecasting, legal requirements, sales, customer relations, advertising and mar keting
Business creation:	2000: 5,000 new outlets; 2001: 3000 new outlets
Employment:	entrepreneur development program job creation 2000: 12,900
	Total Coca Cola system in South Africa: 30,000 (current)

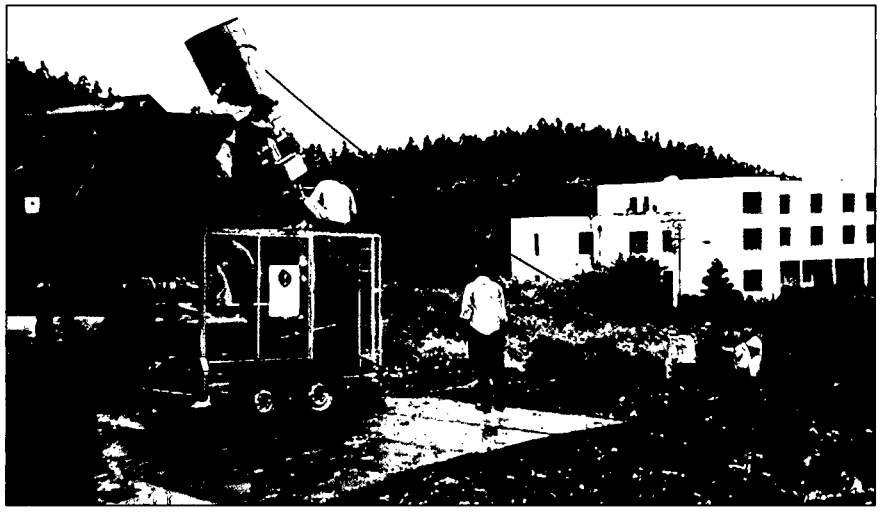
CH2M HILL: Landfill Energy Recovery Projects - China

In November 1997, engineering and construction firm CH2M HILL was hired to assist the State Environmental Protection Agency (SEPA) of the Peoples' Republic of China. CH2M HILL provided advice on technical and economic feasibility and construction requirements for energy recovery facilities at municipal solid waste landfills. The project was intended to provide incentives for eliminating greenhouse gas emissions of methane from landfills as China develops modern solid waste disposal methods.

In many of China's cities, solid waste disposal sites are not yet properly contained with impermeable lining systems and liquid and gas removal systems that are now considered standard practice in many countries. The project was conceived by China's SEPA as a way to promote better waste management practices through the adoption of proper landfill containment. Proper containment is a prerequisite for efficient recovery of methane, which produces economic benefits from using or selling the recovered methane as fuel.

The objectives of the project were to:
- Establish demonstration plants to capture methane from landfills and use it as fuel or to generate electricity
- Create a training facility for landfill operators, energy service companies, municipalities, and other businesses on building and operating landfill gas energy plants
- Set up institutional arrangements to operate landfill gas recovery technology and produce and sell gas and electricity at each site
- Demonstrate approaches to establish the price of electricity generated and lower the cost of future plants to make landfill-gas electricity financially viable
- Prepare an action plan to promote the widespread replication and adoption of landfill gas recovery technology in China

CH2M HILL worked closely with SEPA and the international funding agency (GEF) as well as the public works bureaus and environmental protection bureaus in each of three pilot cities.



Capacity building for both technical and institutional requirements was a major component of the project. Both technical hardware and an extensive training program were provided to the appropriate personnel in each city who would be responsible for implementing the energy recovery projects.

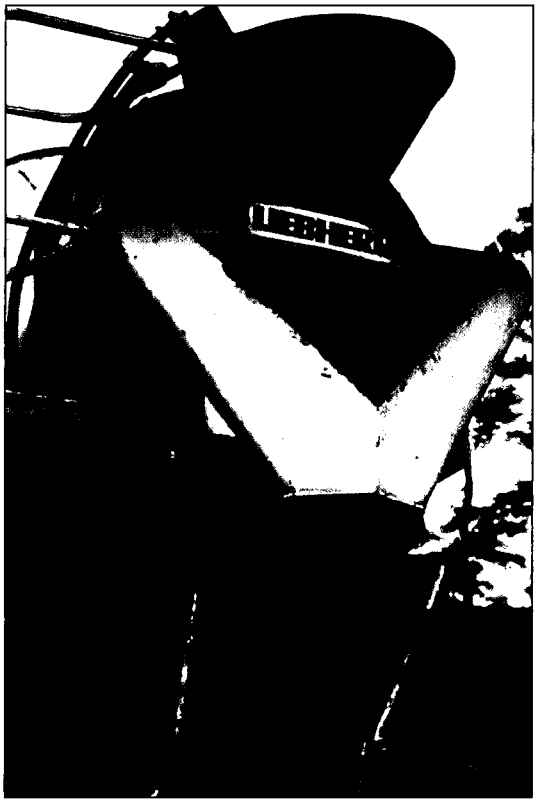
The initial project schedule was four years and the funding was to cover feasibility studies, training of Chinese technicians and purchase of equipment for constructing energy recovery systems at three selected demonstration sites. The feasibility of the projects in each of the 3 cities selected has been demonstrated and the capacity building efforts have been underway for some time. However as of March 2002, the project is approximately two years behind schedule.

Approximately 60 technicians and supervisory personnel were trained at each of the project cities. As a result, the SEPA and public works bureau personnel who have participated to date will provide an indigenous source of knowledge to help other cities in China in developing similar projects. This experience by Chinese engineers should provide substantive assistance in overcoming the communication and institutional problems that have been encountered in implementing the demonstration projects. In that case, the value invested in these demonstration projects will have been realized.

Project type:	Technical assistance
Locations:	3 cities – Nanjing, Anshan and Maanshan
Driver:	State Environmental Protection Agency (SEPA) of the Peoples' Republic of China
Organizations:	State Environmental Protection Agency of the Peoples' Republic of China (SEPA), United Nations Department of Economic and Social Affairs (UNDESA)
Cost:	US$19.5 million
Funding:	Global Environment Facility Allocation: US$5,285,000; Co-financing (Chinese cities): US$14.28 million
Training:	60 technicians and supervisory personnel trained

RMC Readymix India

In late 1994 RMC Group determined that it should selectively expand beyond its operations in Europe and the USA into developing economies that would provide future growth opportunities. One selected country was India, where the Group set up a joint venture company, RMC Readymix India, with a local business partner. The company's objective for all overseas operations is, wherever possible to maximize the proportion of local labour employed. However, while India enjoys a well-educated and plentiful pool of human capital, when RMC entered the market there was effectively very little expertise in India in what was, and still is, an embryo industry. The company therefore commenced its operations with an expatriate General Manager and Technical Manager, but sought to recruit Indian nationals and to develop their capabilities over time.



RMC Readymix India also targeted younger employees to overcome some of the negative behaviors often associated with longer standing exposure to rigid systems and hierarchies. An important first step was to ensure all new employees understood the values, goals and standards of the new business. The company targeted fresh graduates from Engineering Institutions with little or no experience. The selected candidates undertook an intensive training program which gave them a clear idea about: the concrete industry; the processes and procedures required to achieve International Standards; the ways and methods for the industry to go forward; the setting up of new units; and operational and technical aspects. This was also followed for middle management and at an operational level. RMC's global standards for health and safety, environment and operational procedures were introduced from the outset. The company also designed a lecture series, specifically targeted as a capacity building exercise for India. This brought together a number of technical experts to promote good concrete and construction practices.

In addition, the company has been working with the Bureau of Indian Standards to develop new industry standards during the past five years. As a result, a new Indian Standard for ready mixed concrete is due to be adopted in late 2002. Furthermore, the company is actively encouraging other ready mixed concrete companies to form a trade association to promote technical standards for the development of the material and where appropriate, act as a lobbying tool with local, state and national government bodies.

RMC Readymix India's first plant was commissioned in May 1997 and the company currently operates four ready mixed concrete plants in Mumbai, Navi Mumbai, Chennai, and in Bangalore. An additional plant is under construction in Mumbai. During the last 18 months the company has also acquired aggregate plants in Chennai and Bangalore, and is currently developing a Greenfield quarry in Navi Mumbai. There are now no expatriates amongst the 180 employees and one of the company's first recruits has been appointed Chief Executive.

Over the past 5 years, a small number of global plant and equipment suppliers, who also recognize the potential of the Indian market, have established joint ventures with a view to manufacturing in India. RMC Readymix India has been proactive in encouraging this development, as well as working with indigenous suppliers to improve the quality and service of their products.

Project type:	Joint venture cement business
Drivers:	Selective expansion outside of Europe and the USA
Training:	RMC's global standards for health and safety, environment and operational procedures; RMC Group site exchanges; distance learning programs
Standards:	Developed new Industry Standard with Bureau of Indian Standards
Status:	First plant was commissioned in May 1997. In total, four ready mixed concrete plants, in Mumbai, Navi Mumbai, Chennai and Bangalore
Annual Sales:	131,611m3 concrete; 152,294 tonnes of aggregates

Key findings & recommendations

This report provides an analysis of technology cooperation from the perspective of ten member companies of the WBCSD. In each case, we have analyzed the company's contribution to developing industrial capabilities, and results, benefits, challenges and success factors have beeb identified.

While each project demonstrated its own series of specific challenges, there were a number of common hurdles that emerge from the analysis of the ten cases.

In addition, several key success factors and recommendations have been identified from these projects. These are directed to both the policy-maker and business audiences.

Challenges

Framework conditions

Engaging with different levels of government
Varying levels of support from state, national and local governments presented challenges. Different levels of government – municipal, state, and federal - provided inconsistent feedback and varying levels of support; the need to renegotiate on a regional basis was time consuming. A lack of support from local governments hindered progress for several projects.

Hierarchical structures and procedural formality
The institutional requirements of some host governments often caused considerable delays in information exchanges and held up project schedules. Rigid hierarchical structures in government bureaucracies often made it necessary for a large number of individuals to review documents, for instance. Further, complex form filling processes for gaining licenses and approvals often delayed project implementation.

Land acquisition
Acquiring and leasing land was challenging in some countries. This included difficulties in gaining clean title to land, as well as the extensive procedural requirements that consumed considerable time in pre-implementation phases.

In addition to the aforementioned framework conditions, constantly changing tax rules, protectionism of national companies failing to comply with standards, corruption, inflexible labor rules, and political instability and civil disruption were also highlighted as impediments.

Attracting local firms/partners/participants

Challenges also emerged where a project or joint venture proposal involved new technologies unfamiliar to potential business partners. Finding local partners and project participants with values and goals aligned with the investing company proved difficult, especially when seeking partners and/or project participants with a long-term perspective and a high level of commitment. The difficulty in attracting investors - especially smaller firms or individuals - in new unfamiliar businesses was also highlighted.

Infrastructure

In the less developed regions in particular, weak infrastructure presented many hurdles to progress. This included transport difficulties where roads were poor or even non-existent, particularly for the delivery of heavy and bulky construction materials. This was also a problem when the geographic spread of technology recipients was broad. In these instances, both the delivery of hardware, information and training was a challenge. Other aspects, such as the availability of electricity and telecommunication facilities, also hindered planning and implementation of projects.

Communication for project planning

Language and dialect differences were a common stumbling block for project planning. Where translation was required, the high level of technical terminology often hindered communications. Uneven quality of translation and interpretations presented additional challenges given the importance of common understandings by all parties involved in the projects.

Differing business styles

Different cultures often have a differing style of conducting business. At times, this presented a challenge to project participants and made it necessary that time be devoted to developing better understandings of these different business cultures. Inter alia, this included the influence of societal structures on hiring practices, adherence to quality standards, the role of women in business activities, and the varying decision making styles.

Quality of local supplies

The quality of local suppliers was in some instances inadequate. Where local suppliers were unable to meet required standards it was necessary to source outside the region or country, thereby restricting efforts to maximize local content and reduce costs.

Human resources

Where businesses sought to minimize expatriate employees, a lack of an adequately skilled workforce in the operating region presented a challenge. Low education levels of potential employees were a particular impediment to maximizing a local employee base.

Education and Training

Specific challenges were identified in relation to the education and training components of projects. These centered predominantly on challenges in communication such as language difficulties, education levels and the availability of facilities for communication. Generating and maintaining enthusiasm and commitment to capacity building programs was also highlighted.

Language
Different languages and dialects – official and unofficial – made the delivery of training difficult. There was a need to customize material, and sensitivity to local dialects over 'official' languages was vital for acceptance of training programs.

Education levels
As with sourcing new employees, training and development was hindered by the often low and/or inconsistent levels of education. There was a correlation between low levels of education and lower levels of enthusiasm for education and training activities, which often made the delivery of training more difficult. In particular, where literacy rates were low the provision of written training material was not possible and new approaches had to be designed.

Training facilities
In instances where training activities sought to target people in remote regions, distance from training facilities and logistical constraints to bringing people together was problematic. In the less developed regions, lack of basic facilities such as electricity made delivery of training material more challenging where these had previously relied on education videos, overhead projections or computer presentations.

Enthusiasm and commitment
For some participants in education and training activities it was a challenge to maintain high levels of commitment and enthusiasm. Those with lower levels of education were more likely to become frustrated and not attend training sessions, and for some participants it was vital to use a variety of communication mediums to maintain interest and enthusiasm. In some countries, it was an additional challenge to encourage active participation from women, especially when training activities were far removed from normal activities and where they were not used to taking on such roles. To address these challenges it was necessary to communicate the benefits of participation and align this with the objectives of the individual.

Success factors

For the Technology Recipient:

The Enabling Environment

Government actions can transform the conditions under which technology cooperation takes place. Sound economic and regulatory frameworks, transparency and political stability can make a country a more attractive option for both public and private sector technology transfer. A clear policy framework for technology transfer and cooperation, both for a technology donor and recipient or user are necessary.

National technology priorities

Technology and development needs, as exemplified by the cases in this study, differ greatly in each country, and in some instances between regions. Building industrial capabilities can require technology cooperation that delivers state-of-the-art manufacturing technologies, but it may also require the delivery of more basic and sometimes small scale, regionally tailored infrastructure technologies. Where a region lacks basic electricity, water and sanitation services for example, this technology need must be met, before sustainable industries can be developed and expected to grow. Funding and support should be provided for projects that can deliver basic facilities and fuel the development and growth of micro-entrepreneurs and small-scale industry. This is a necessary first step that can lay a foundation for technological development and industrial growth.

Financing Arrangements

Governments can reduce the risk to foreign investment from technology providers. This support can come from the technology recipient/host country governments as well as donor governments of other countries.

Government financing for development must include provisions for industrial development. This includes, in particular, the necessary foundations for industrial growth and capacity building. Such foundations may include developing knowledge and skills in planning and management, in contract negotiations and public procurement. Financing should also be directed at technological foundations, such as electrification, that enable people to develop small-scale industries.

This requires the creation of greater synergies between ODA and FDI in the context of fueling sustainable development for developing countries. This includes identifying untapped opportunities for joint ODA/FDI, especially in Less Developed Countries (LDCs), using ODA to build the foundations for sustainable industrial development, and developing innovate uses for ODA that reduce the risk of foreign investments in developing countries.

For the Technology Provider:

Generating acceptance and understanding

Acceptance and understanding needed to be generated at the local 'user' level. It was essential that the proposed technology have an anticipated future benefit and contribution to improved livelihood. A fundamental first action for many projects was the provision of basic explanations, conveying the message of 'why' a technology should be adopted. Efforts devoted to explaining the technology and its potential benefits enhanced the initial acceptance of the technology as well as the presence of the implementing organization(s). This also enhanced the effectiveness of subsequent capacity building efforts.

Where a technology is new to a region and community, be it technological hardware or a new technique, the provision of basic information was of particular importance for reducing initial resistance and generating buy-in. This is exemplified in the cases where the recipient community had never paid for a service and had never received electricity.

Establishing clear benefits from the projects was vital for generating initial acceptance and for maintaining enthusiasm and commitment. Finding project partners and engaging capacity building participants, for example,

required the clear conveyance of economic benefits. In addition to providing knowledge and skills, it was essential to provide appropriate incentives.

Assessment and adaptability

Pre-project assessment was a vital stage in all cases. This frequently included a formal feasibility study, but projects here clearly highlight the benefit of a detailed assessment of the people to be involved and their needs and capabilities. It was also important to assess existing infrastructure to determine what was possible and how needs could best be met with the technology. In some cases this required a detailed analysis of the needs and capacities of separate regions, communities and even individuals.

The cases exemplified the necessity of a detailed assessment for determining how the technology will be managed once implemented. Some projects required that technology management models be based on institutional capabilities, community capacities, and economic realities. This required innovative payment schemes and novel institutional structures. This was particularly so where a community had not have paid for services before, or where they did not have experience in managing the payment for services or the maintenance of hardware. Neighborhood associations, ad-hoc committees, and other forms of networks were successful organizing structures utilized to enhance the technology transfer.

Post-project assessment and monitoring mechanisms
Conducting post-project assessment and developing monitoring mechanisms contributed to both the success of the projects, as well as to the ability to replicate them based on lessons learned and documented in other locations. Post project assessments that could be analyzed comparatively with pre-project assessments also proved to be useful for determining the impact of the project. The development of monitoring mechanisms also allowed for incremental improvements to be made during the implementation of the project.

Capacity building

All projects benefited from capacity building activities. In fact some were specifically focused solely on the transfer of knowledge and skills, hence capacity building was the foundation of the technology cooperation.

Where a project involved the transfer of technological hardware – solar systems, manufacturing equipment, entire production facilities – capacity building proved essential to the successful transfer and diffusion of this hardware. Specifically however, these projects highlighted a number of key factors for ensuring capacity building efforts are most effective. These included: the extension of education and training to other groups, such as community or school groups, and the inclusion of women and children; the need to adapt the method and delivery of education and training based on local conditions and the knowledge and skill levels of the recipients of the training; and the benefits of having a local base of trainers.

Broadly inclusive efforts
Capacity building efforts were successful where the target audience was broad and inclusive. Several programs extended to regular community involvement, targeted efforts to engage women and children, and also school groups. This was particularly successful in rural communities and in areas where women were not previously included in activities or the workforce (cultural sensitivity was of course vital). The inclusion of children in capacity building activities was a positive contribution where this was likely to contribute to an ongoing process of learning and positive change, and the sustainability of the technology over time.

This type of stakeholder inclusion in capacity building efforts differed greatly by type of project, but in some cases it was vital to the projects success to create a sense of ownership to ensure sustainability of the technology transferred.

Adaptability to recipients
Education and training schemes were most successful when based on a thorough understanding of the participants and tailored to this and specific local conditions. Where education levels were low, it was most effective to use a variety of mediums to convey messages – both to maintain enthusiasm to people not familiar with such programs, as well as to overcome low education and literacy levels.

Local trainers
Developing capable local trainers contributed to success and sustainability. Where specialized skills were made available locally, projects benefited from the language skills, cultural understandings and local acceptability of these individuals delivering training. This also contributed to local employment and ensured that specialized trainers are available for future capacity building activities.

Dialogue and partnerships

Local R&D institutions
Local R&D institutions proved to be valuable partners. In particular universities and other research institutions that possessed both local knowledge and specialized capabilities,

made valuable contributions in the early stages of projects. In addition these institutions proved to be valuable partners over time for conducting ongoing research for technology maintenance and improvements. They are also well placed to review the success and sustainability of technology transfers.

Other stakeholders

Engaging other stakeholders enhanced projects success. A joint effort with local authorities and local organizations provided access to local knowledge and enhanced acceptability of projects. Project planning was enhanced in many instances by the inclusion of pre-project stakeholder dialogues and the inclusion of stakeholders in decision-making.

Communication and interaction

Effective communication and personal interaction were key emerging themes. The frequency of interactions between cooperating parties in the technology transfers was identified as a contributor to success. This was particularly true when there was a high degree of personal, face-to-face interaction. Maintaining progress required, in many cases, frequent communications and regular follow- ups, in all phases of the projects. Language differences required either multi-lingual participants and/or highly effective translators, as common understandings are vital.

Learning works both ways

Exploitation of projects as learning opportunities was highlighted as a contributing success factor to future projects. Each technology transfer project is different and requires local sensitivity and adaptation, however key learnings from each project were noted as enhancing the organizations ability to replicate the technology transfer successfully in other locations.

For all involved parties:

Cooperation and commitment

Technology cooperation requires all cooperating parties to gain from the cooperation. Building partnerships between those who have the technology and those who need it is likely to be more effective when both parties have a vested interest in the success of the project and its continuing operation.

Technology cooperation can be enhanced via business-to-business partnerships. Such cooperation is thought to be most successful in a commercial setting that involves beneficial cooperation between two companies. In addition, cooperation with research institutions, local and national governments, NGO's and intergovernmental organizations strengthens the adaptation, diffusion and sustainable use of new technologies.

A commitment from all involved parties was vital for successful implementation and sustainability. This was clearly demonstrated in the study for all types of technology transfer. The sustainability of new ventures, the acceptability and adoption of new techniques and the endurance of partnerships required commitment to a relationship that was mutually beneficial for all parties.

Appendix - Bibliography

- UNCSD (1998), Technology Cooperation and Assessment; Sixth Session Background Paper No. 12
- WBCSD (1998), Technology cooperation for sustainable development: Position Brief.
- WBCSD (2002), Improving synergy flows between ODA and FDI to developing countries: A business perspective; OECD round table on sustainable development; Paris: OECD.
- Schmidheiny, BCSD, (1991) 'Changing Course: A global business perspective on development and the environment', MIT Press: London, U.K and Cambridge, U.S.
- IPCC, (2001), Methodological and technological issues in technology transfer: Summary for Policy Makers. A special report of Working Group III of the Intergovernmental Panel on Climate Change.
- UNDP, (2001) 'Human Development Report 2001: making new technologies work for human development', Oxford University Press: New York.
- IMF (2002) The role of capacity building in poverty reduction. IMF Issues Brief. Available at www.imf.org/external/np/exr/ib/2002/031402.htm
- IMF (2001), International Capital Markets: Developments, Prospects, and Key Policy Issues.
- UNIDO (1996), 'Manual on Technology Transfer'. General Studies Series, UNIDO:Vienna.
- ICC/WBCSD, (1998), 'Technology cooperation and assessment', ICC/WBCSD Background document, UNCSD: 1998. Available at www.iccwbo.org/home/statements_rules/statements/1988/final_technology.asp

about WBCSD

The World Business Council for Sustainable Development (WBCSD) is a coalition of 160 international companies united by a shared commitment to sustainable development via the three pillars of economic growth, ecological balance and social progress. Our members are drawn from more than 30 countries and 20 major industrial sectors. We also benefit from a Global Network of 35 national and regional business councils and partner organizations involving some 1000 business leaders globally.

Our mission

To provide business leadership as a catalyst for change toward sustainable development, and to promote the role of eco-efficiency, innovation and corporate social responsibility.

Our aims

Our objectives and strategic directions, based on this dedication, include:

Business leadership – to be the leading business advocate on issues connected with sustainable development.

Policy development – to participate in policy development in order to create a framework that allows business to contribute effectively to sustainable development.

Best practice – to demonstrate business progress in environmental and resource management and corporate social responsibility and to share leading-edge practices among our members.

Global outreach – to contribute to a sustainable future for developing nations and nations in transition.

about UNIDO

The United Nations Industrial Development Organization (UNIDO) was established in 1966 and became a specialized United Nations agency in 1985. Its work and activities are dedicated to promoting, in cooperation with its 169 Member States, sustainable industrial development in countries with developing and transition economies.

Mission

UNIDO helps these developing countries and countries with economies in transition in their fight against marginalization in today's globalized world. It mobilizes knowledge, skills, information and technology to promote productive employment, a competitive economy and a sound environment. Carlos Magariños, the Director-General of UNIDO, describes the Organization as a specialized United Nations agency that focuses its efforts on relieving poverty by fostering productivity growth.

Services

UNIDO's services are designed to be easily integrated into country-specific packages and local ownership ensures a custom-made approach. Services provided by UNIDO cover the following areas:

- Investment and technology promotion
- Industrial governance and statistics
- Quality and productivity
- Small business development
- Environmental management
- Industrial energy and Kyoto Protocol (Climate Change)
- Montreal Protocol (Reduction and elimination of ozone-depleting substances)
- Agro-industries

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