

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

**BUILDING CAPACITY FOR TECHNOLOGY
TRANSFER FOR SMALL AND MEDIUM
ENTERPRISES IN LEAST
DEVELOPED COUNTRIES**

**Proceedings and Papers presented at the National Seminar on
Building Capacity for Technology Transfer for
Small and Medium Enterprises in Least Developed Countries:
A Case in Nepal's Development
Kathmandu, 12-13 November 2003**



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ABBREVIATIONS

ADB	Asian Development Bank
APCTT	Asian and Pacific Centre for Transfer of Technology
ASEAN	Association of Southeast Asian Nations (<i>comprises Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam</i>)
BMOs	business membership organizations
FDI	foreign direct investment
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
FNCSI	Federation of Nepalese Cottage and Small Industries
GATT/WTO	General Agreement on Tariffs and Trade/World Trade Organization
GDP	gross domestic product
ICT	information and communication technology
IEDI	Industrial Enterprise Development Institute
IMF	International Monetary Fund
LDCs	least developed countries
M&A	mergers and acquisitions
MNCs	multinational corporations
MoICS	Ministry of Industries, Commerce and Supplies
NGOs	non-governmental organizations
NIEs	newly industrialized economies
OECD	Organisation for Economic Co-operation and Development (<i>comprises Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland, and United States of America</i>).
R&D	research and development
RECAST	Research Centre for Applied Science and Technology

RONAST	Royal Nepal Academy for Science and Technology
S&T	science and technology
SARS	severe acute respiratory syndrome
SMEs	small and medium-sized enterprises
TNCs	transnational corporations
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

**I. ORGANIZATION OF THE NATIONAL SEMINAR ON
BUILDING CAPACITY FOR TECHNOLOGY
TRANSFER FOR SMALL AND MEDIUM ENTERPRISES
IN LEAST DEVELOPED COUNTRIES:
A CASE IN NEPAL'S DEVELOPMENT
KATHMANDU, 12-13 NOVEMBER 2003**

The National Seminar on Building Capacity for Technology Transfer for Small and Medium Enterprises in Least Developed Countries: A Case in Nepal's Development was held in Kathmandu on 12 and 13 November 2003. The Seminar was organized as a result of the request made by His Majesty's Government of Nepal through the Office of the Industrial Enterprise Development Institute (IEDI). The Seminar was attended by 60 participants, representing government offices, private sector organizations, academic institutions and several non-governmental organizations (NGOs) involved in promoting small and medium enterprises (SMEs) in Nepal.

The Seminar adopted the following recommendations.

1. It strongly emphasized that the Government needed to effectively implement policies and strengthen institutions specially established for promoting and supporting small and medium enterprises. Institutions created for such purposes should be provided appropriate and adequate financial and other necessary resources.
2. Entrepreneurship development programmes, including development of women's entrepreneurship, and business start-up initiatives should be promoted and nurtured through the organization of training at the centre and district levels. The public-private sector agencies/offices would have to play a major role in organizing such programmes.
3. Government should strengthen facilities for promoting and developing appropriate vocational and technical education and training. Every effort should be made to make such training facilities accessible to a large group of rural youth.
4. Facilities for building up the technological capabilities of micro-enterprises, cottage and village enterprises, and small and medium enterprises should be promoted through support facilities from the Government. Such facilities should be provided by promoting clusters of enterprises and institutions.
5. Government and the private sector should jointly identify areas/subsectors of comparative advantage of Nepal and should promote these areas to strengthen their competitiveness. In this respect, the Seminar felt that tourism, information technology-related products, herbal products, handicraft products, carpets, pashmina and woollen goods could be among the products in which Nepal could have comparative advantage. In the long run, other agro-based products, hydro-electricity and energy-intensive products could be further identified for promoting competitiveness.

6. Government and private sector organizations and enterprises should make every possible effort to promote wider application of information and communication technology (ICT). Institutions for ICT education and training should be promoted with larger resource allocation by the Government.
7. Private sector organizations, especially the Federation of Nepalese Chambers of Commerce and Industry (FNCCI), should strengthen human resources development activities, especially in promoting the business skills needed for the private sector. FNCCI and the Federation of Nepalese Cottage and Small Industries (FNCSI) should strengthen its Human Resource Development Centre and make it more effective and operational.
8. The Government should provide increased resources to institutions involved in promoting technological activities. In this respect, institutions such as the Royal Nepal Academy for Science and Technology (RONAST) and the Research Centre for Applied Science and Technology (RECAST) should be further strengthened and resources augmented for them. Other institutions to cater for the technological needs of SMEs should be created and strengthened.
9. Every effort should be made to record and systematize the traditional technical knowledge available in the country. The processing of herbs and agro-products by traditional methods should be translated and developed into knowledge and commercialized.
10. Effective tripartite collaboration between the Government, the private sector and academic institutions should be instituted to identify and promote the specific managerial and technical skills especially required for the industrial and business sectors.
11. The Seminar emphasized that selected priority areas such as herbal medicine, which had immense potential for value addition through technological upgrading in Nepal, should be further developed and promoted. In this context, it was appreciated that the initiative taken by the Asian and Pacific Centre for Transfer of Technology (APCTT) to set up the Asia Pacific Network on Traditional Medicine and Herbal Technology (APTMNET) would lead to setting up a model station in Nepal. It could link up with 14 other countries of the region in the same field. The participants recommended that Nepal should take steps to set up the national model station at the earliest opportunity and organize programmes for enhancing the capabilities of SMEs in cooperation with ESCAP/APCTT.

II. FOREIGN DIRECT INVESTMENT AND TECHNOLOGICAL CAPABILITY-BUILDING IN LEAST DEVELOPED COUNTRIES: A CASE FOR NEPAL

*Bhavani P. Dhungana**

A. Introduction

Societies, economies and nations have changed dramatically over the last five decades. They have changed politically, economically and socially with far reaching implications of changes on the life styles, living conditions, consumption patterns, production systems, thinkings and ways of doing things whether in business, family management, cooperation with each other or even in conflicts and war. Nations and economies have dismantled barriers to trade and investment, have promoted integration of their economies and production networks and have generated wealth through improvements in production, productivity and values in the whole chain of production systems and businesses. As a result of all these changes, the structure of economies have changed, market-orientation and individual and corporate initiatives rather than state domination have been given prominence, levels of socio-economic development in most of the cases improved and trade among nations have increased. Developing countries have strengthened their position and emerged as challengers to developed countries, capital availabilities have increased and regionalism and multi-lateralism are gaining strengths than national autarky and isolationism. In these changes, there are some strong messages, as all countries and economies have not gained or performed positively. There are national differences, and opportunities and challenges have been different for different societies, economies and nations. These processes of changes categorized as “globalization and liberalization” have ushered new options and challenges and they are continuously evolving and evolving at a rapid pace. National authorities and multi-lateral organizations with support from members are progressively opening new opportunities for socio-economic development and business transactions everywhere. Exploitation and benefits from these opportunities require strengthening of competitiveness – a force that needs to be generated and augmented through concerted efforts from all sectors and actors of national economy.

Competitiveness is the key word these days for survival, sustenance and for gain. In the absence of competitive strength, nations and societies will lag behind and economies will remain marginalized. Therefore in meeting the challenges of competitiveness, societies everywhere should continually seek coherent strategies to integrate into the global and regional systems efficiently, and on terms that suit one’s economy and promote sustained growth. In a country such as Nepal, the growth should especially benefit the poor. Government is the binding agent of this strategy. It describes the way in which the main players in society, governments, businesses and civil society, can align their agendas and manage their society for their individual and collective benefit, and in this case around the specific needs and challenges of globalization. It should also describe how players outside the mainstream, especially the poor, unemployed and those in the informal sector, would be motivated to contribute their added value to society.

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In many countries, a number of business sectors, governments, trade unions and NGOs are working together already to lead the way in making their societies and economies as one of the winners of globalization. Unfortunately many of the least developed countries, including Nepal, have not been able to move in tandem with those calls of the modernization and socio-economic transformation. While globalization and liberalization have brought challenges that demand a new role for the government, business sector and civil society and a need to align new agendas for the collective benefit of the nation, some countries have not been able to move and match those requirements. Institutions, leaders and managers have been unable to review and understand responsibilities, build-up capabilities and move ahead. Petty squabbles, quarrels and vested interests have distorted and misguided national priorities. It is however not too late to move in the right direction. Collectively, everyone within the nation must work for nation's priorities and competitiveness.

There are many ways of improving competitiveness and being able to move the nation's economy for the betterment of its people. It is not the intention of this paper to dwell on all the facets of competitiveness and national development, but only to sensitize readers on one issue, i.e., how a least developed country could strengthen its technological capability through promotion of foreign direct investment (FDI), so that needed resources could be generated and development could occur benefiting the poor people of the country. It is a well established fact that economies need to develop the resource base to attract the kind of investment that spurs growth and multipliers, and enhances sustainable development, spreading knowledge and opportunity for all and this process has to be owned and nurtured by society concerned with a fair stake and benefit to all. Nepal is not an exception in this context.

Therefore, this paper will concentrate on reviewing and examining the issues as to how a least developed country such as Nepal can promote FDI, and through it, build-up technological capability for economic development and competitiveness.

We are all aware that FDI is the new driving force for international and regional fragmentation of production, a phenomenon that has brought substantial volumes of business to many parts of Asia. It also has the potential to bring new technologies, moving production up the value chain and creating new opportunities for sustainable human development – knowledge and opportunity. With negotiations in investment on the horizon, societies need strategies to connect investment policy with the needs of industry and the stance of investment negotiators. At the same time, infrastructure and trade must support investment policy, along with measures that promote research and development (R&D), competitive clusters and a skilled workforce in order to remain competitive on technology if not on cost. But how can economies such as Nepal and other least developed countries (LDCs) prevent a race to the bottom? What attracts investors and how will they be persuaded to direct finance that increases the value-addition? These are important issues to be addressed and attempts have been made in this paper.

B. Global and regional issues: implications for foreign direct investment and technological capacity-building in least developed countries

While addressing the issues and strategies to be followed for technological capacity-building at the national level in LDCs, it is highly essential that the economic trends and events at global and regional levels be strictly analysed and watched, as no country/economy can remain aloof from changes occurring at those levels. This is even more important if the objective is to assess the prospects for attracting FDI and thereby build-up technological capability for improved competitiveness. Therefore, a brief analysis of critical global and regional issues and trends having direct implications for capacity building for improved competitiveness in developing countries, especially in LDCs, is presented below.

1. Global and regional developments in output and trade

Despite some weak recovery in major industrial countries in 2002 and somewhat subdued performance in the early part of 2003, the overall global production and trade performance in the early years of the twenty-first century can be regarded as somewhat encouraging. Though the performance in Europe remains somewhat uncertain, but the surprising turnaround in Japan and the unfolding recovery in the United States of America indicate that the global economy may gain momentum and is predicted to be better in the last quarter of 2003 and early part of 2004. Thus global production had increased by 1.9 per cent in 2002 and is expected to be 2.0 per cent in 2003. Forecast for 2004-2005 is expected to be in the range of 2.9 per cent.¹ Growth rate in industrialized countries was 1.6 per cent in 2002, 1.5 per cent in 2003 and is expected to be 2.4 per cent in 2004-2005. A notable feature of the current recovery is the lack of the synchronization of growth among the major industrial countries, with the United States economy significantly outperforming most other developed economies. Overall, accommodative monetary and expansionary fiscal policies in other industrial countries will contribute to higher growth. Hence, there is a stronger sense of optimism than just a year ago, although risks to the outlook remain significant.²

Developing countries had an average growth rate of 3.3 per cent in 2002 and likely to have 4.0 per cent in 2003. Growth rate in 2004-2005 is expected to be in the range of 4.9 per cent.

Growth rate in the Asian region remained remarkable with 6.5 per cent in 2002 and 5.6 per cent in 2003 in East Asia. South Asia had a growth rate of 4.2 per cent in 2002 and 5.8 per cent in 2003. The overall rate of growth in Asia and the Pacific was 5.6 per cent in 2002 and is expected to be 5.3 per cent in 2003 (see table II.1). Despite significant shocks in 2003, including uncertainties of conflict in Iraq, regional terrorist threats, higher oil prices and Severe Acute Respiratory Syndrome (SARS), most economies of the Asian region performed well. Overall growth prospects in the Asian region over the period 2005-2015 remains encouraging with a forecast of 5 to 6 per cent.³

¹ World Bank, *Global Economic Prospects 2004: Realizing the Development of Promise of the Doha Agenda* (Washington, 2003) p. 280.

² Asian Development Bank, *Asian Development Outlook 2003 Update* (Manila, 2003) p. 4.

³ World Bank, *op. cit.*, pp. 235-238.

The global production was expected to pick up in 2003, somewhat lower than expected, whereas the trade growth in 2003 is expected to be an improvement over the performance of 2001 and 2002, but remains below the 1993-2002 average.⁴ Export volumes from developing countries are expected to expand at a rate close to double digits, with much of this growth concentrated in Asia and the Pacific region. In nominal terms, aggregate exports from developing Asia, accounting for around 18 per cent of world exports, grew at a rate of almost 20 per cent in the first half of 2003. Intraregional exports were especially strong in particular to China from East Asia which is emerging as a major hub for production and trade network.

Table II.1. Economic growth rate in developing Asia and the Pacific, 2000-2004
(Annual percentage change)

<i>Country/area</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003(est)</i>	<i>2004 (forecast)</i>
East Asia	8.1	4.4	6.5	5.6	6.5
South-East Asia	6.2	1.7	4.1	3.9	4.9
South Asia	4.5	5.0	4.2	5.8	6.1
Afghanistan	-	-	-	-	-
Bangladesh	5.9	5.3	4.4	5.3	5.7
Bhutan	5.3	6.6	7.7	-	-
India	4.4	5.6	4.3	6.0	6.3
Maldives	4.8	3.4	6.0	4.2	2.8
Nepal	6.0	4.6	-0.5	2.3	3.5
Pakistan	3.9	2.2	3.4	5.1	5.0
Sri Lanka	6.0	-1.5	4.0	5.0	5.5
Central Asia	8.2	10.8	7.3	7.5	5.9
The Pacific	-0.4	0.3	-0.3	2.5	2.7
Average (developing Asia and the Pacific)	7.1	4.1	5.6	5.3	6.1

Source: Asian Development Bank, *Asian Development Outlook 2003 Update*, 30 September 2003, Appendix, page 97.

Though the trade policy environment benefited from the momentum generated by the Doha Conference, the global trade talks continue to be stalled in several policy domains vital to developing countries – agriculture, non-farm trade, special and differential treatment, and dispute settlement. Nor are there significant and satisfactory progresses in other contentious areas, such as the issues related to investment, competition, trade facilitation, and government procurement.⁵ The recent failure of the Cancun meeting is one more testimony to the reality that for the international arena of negotiations and the global trade system to be fair and free, it will take time and the developing nations need to

⁴ Asian Development Bank, *op. cit.*, p. 6.

⁵ World Trade Organization, *World Trade Report 2003* (Geneva, 2003) p. xii.

emerge more collectively and strongly and work even more in a cooperative manner in future. The developing countries, and enterprises in those countries, not only need to continuously stimulate and strengthen competitiveness in an evolving global and regional production network and competitiveness in their business environment, but also need to strengthen their bargaining and negotiating position in global trade negotiation forums. At the same time, a continual challenge facing the trading system is to secure balanced outcomes faithful to these core tenets which at the same time accommodate the divergent needs, interests and priorities of the membership, including those of smaller and weaker countries. This is a moving target, and the mix that has emerged from the interplay of principle and pragmatism at different stages of the GATT/WTO's development has never seemed ideal to all participants in the system. But as long as governments believe that no serious alternative exists to cooperation, they will negotiate and the system will continue to modify and redefine itself. It is this essential process of modification and redefinition that underlies negotiations like those upon which members embarked at Doha in November 2001.⁶

2. Liberalization

Over the last two decades, the global economy has witnessed a rapid pace of economic reforms leading to the liberalization of national economies, especially in the areas of trade and investments. The successful conclusion of the Uruguay Round of multilateral negotiations and the interest and success of countries in joining the World Trade Organization (WTO) further expedited that process. All these factors are not only leading further liberalizations and expansion of global trade but are also increasing global interdependence and integration of production activities and economies. While the implementation of WTO rules and procedures are yet to result in the establishment of a freer and fairer trading system for all countries, and the outcome so far has not been completely free from debates and controversies and it is felt that the principal gainers have been mostly the stronger economies. Yet it is quite obvious that the process when further improved through new rounds of negotiations would eventually benefit all nations. While the failure at Cancun was a great disappointment for all, especially to the developing world, however, the growing realization is that the opening up of markets, reduction of trade barriers and strengthening of domestic private sector, are leading to expanded market access and increased flow of capital, including FDI as well as technologies. Further, although developing countries need policy flexibility to support and promote their enterprises, investments in production and marketing, and export expansion and diversification, latecomers now face more stringent policy conditions than those which prevailed previously. On the one hand, the multilateral framework of WTO rules has in certain cases narrowed the range of policy options for governments: quantitative tools of protection are now largely ruled out, including production allocations and similar means; tariffs are increasingly subject to binding commitments; the transition period for national content and trade balancing requirements lapses at the end of 1999; and export subsidies will no longer be permitted for most developing countries after 2003. On the other hand, commitments undertaken under International Monetary Fund/World Bank Structural Adjustment Programmes have reinforced and widened WTO commitments and accelerated the adoption of non-reciprocal autonomous liberalization measures, and bilateral agreements with major developed countries have further reduced the remaining policy options and WTO flexibility. These forces and processes are creating environments

⁶ *Ibid.*

where enterprises and firms in developing countries, including in LDCs, have to strengthen their competitiveness to remain in the domestic and the international markets.

3. Globalization

The global economy and thereby the national economies are passing through an intensified phase of interdependence and an environment of greater movement of capital and other factors of production, creating new sites for production and production networks. This process termed as “globalization” as mentioned earlier is creating a vast array of external influences on individual economies, societies and ways of organizing and conducting businesses and the overall way of human living. The rapid pace of technological innovations and adaptations, the reduction in transportation and communication distances and costs, extensive and intensive use of information and communication technology (ICT) are further adding momentum to the globalization process. The globalization process is also further driven by the expansion of production activities across countries/economies by transnational corporations (TNCs) and is expected to gather further strength in the coming years. There is an increasing tendency towards greater division of labour between the TNCs and subsidiaries/affiliates or local partners. Several large production enterprises are also attempting to source the parts and components through a system of complementarities and linkages. It is therefore essential that local capabilities of firms and enterprises be developed so that they can be effective partners or subsidiaries of TNCs in this global production networks and in inter-industry or intra-industry trade, otherwise in the rapid global market changes, they will not be able to sustain and maintain their competitiveness and market share.

Globalization has become a hot topic/issue and its implications have been far reaching. The analysis and impact assessment of globalization on firms, economies and societies have been varied and controversial. Societies and experts have been divided on the issues, benefits and challenges of globalization. But one thing is certain. The process is going to gain momentum and intensity. One cannot turn back the clock. One can devise different strategies for dealing with the forces in managing and dealing with globalization. It is generally felt that globalization has increased competitive pressures on firms. Together with rapid technological change, it has altered the environment in which firms operate. It is pointed out that globalization offers unprecedented opportunities for firms to act successfully, while it simultaneously heightens the risks for firms lagging behind. In an open and liberalized world, increasing firm competitiveness has become a major challenge.

Various studies provide thorough analysis of the competitiveness of firms in different regions and detail the different issues related to firm competitiveness from global rules for business, regional business environment, corporate governance, and the key economic sectors of the economies. Several authors have addressed key issues and the real challenges facing firms’ operations and efficiency, the ability of firms to compete in global markets, the impact of small and medium size enterprises on the stimulation of

growth, and the economic potential of the manufacturing sector in the developing countries.⁷ Globalization nevertheless remains a potentially powerful and dynamic force for growth and development. It is an evolving process which presents not only risks and challenges but also opportunities. In order to ensure that it can contribute to laying the foundations for enduring and coherent development, intensified international cooperation as well as countries' own national and collective efforts will be essential to address effectively the shortcomings of the external environment and the constraints of underdevelopment.

4. Technological innovations and changes

One of the major developments of the last two decades is the rapidity with which technological innovations and changes are occurring. This is leading to the shortening of the product life cycles and the emergence of the new products and product differentiations. In this context, technological strategies at the macro level need to be designed ranging from improvements and adaptation of the traditional technologies to the capability building in acquiring and adopting the modern and efficient technologies in various production sectors. Developing countries and enterprises in developing economies need to fully realize that technological capability is the determining factor of competitiveness. In this context, it is essential to note that technological capability building does not relate only to innovations and acquisition of technology but should also relate to management and organization factors and management of technologies themselves. These points need to be addressed at the firm level. Thus availabilities of technological skills, continuous upgrading and innovations at the firm level will be the determining factors of competitiveness of firms and their products. It is therefore highly essential that technological needs be addressed more specifically at the enterprise level. It is in this sense a "bottom-up" approach rather than "top-down" approach would be practical and effective. It is however essential to note that technological needs and facilities for technological build-up has to be conceived and evolved for the different scale of production activities differentiated further at the firm level requirements. The government has to play a major role in developing and creating facilities at the macro level as well as for groups of scale level production units and sectors for technological upgradation and modernization, especially in LDCs. The private sector and the enterprises have to play a proactive role at the firm level.

Furthermore, technological capability-building, including the requisite skills development, is a fundamental aspect of the development process which carries implications for economic restructuring and strengthening of competitiveness. As countries develop, the largely unskilled labour-intensive industries make way for more knowledge-based and technology-intensive industries in order to sustain national competitive advantage. The new industries require advanced and specialized skills to cope

⁷ Joseph E. Stiglitz, *The Roaring Nineties: A History of the World's Prosperous Decade* (New York, W.W. Norton and Company, 2003); Antonio Ocampo and Juan Martin (eds), *Globalization and Development: A Latin American and Caribbean Perspective* (Stanford University Press, September 2003); Samiha Fawzy (ed), *Globalization and Firm Competitiveness in the Middle East and North Africa Region* (Washington, World Bank, June 2002); Simon J. Evenett, Weiping Wu and Shahid Yusuf (eds), *Local Dynamics in an Era of Globalization: 21st Century Catalysts for Development* (Oxford University Press, World Bank, August 2003); and Bhavani P. Dhungana, "Economic integration on industrial production networking: Asia's prospects and challenges in the twenty-first century", *Current Issues on Industry, Trade and Investment No. 1* (ST/ESCAP/2276) (New York, United Nations, 2003).

with new, more sophisticated and complicated technologies. The shift from public sector domination to private sector-led initiatives also necessitates a change in approach and thinking, as private sector industries operate under much more pressure to innovate and to upgrade the skills of the workforce, including management, in order to stay competitive. Competitiveness thus assumes global dimensions, with the pressure to become competitive greater than ever. In addition, as countries cannot avoid opening up their economies if they take economic development seriously, the ensuing inflows of foreign investment and technology imports put increasing pressure on domestic industry to improve performance. In many developing countries, however, the main bottleneck is the lack of adequate skills. In this case, foreign investment can bring with it opportunities and various modalities for skills development, which the host country should tap to the maximum extent possible. This important issue will be further elaborated later in this paper.

It has also to be noted that the globalization process has significantly improved the access of low-income countries to technological upgradation through technology imports provided certain conditions prevail within the country. It has been fairly documented that low-income countries as a group have in fact substantially increased GDP ratio of technology imports over the past few years though there are large cross-country discrepancies in technological upgrading within the group.

General-purpose technology continues to constitute the bulk of technology imports, while sector-specific technology used for labour-intensive activities has gained in importance. Improved access to technology imports appears not to have improved labour productivity and the demand for skilled labour in many low-income countries. To raise the benefits reaped from globalization, governments might need to make additional efforts towards a simultaneous increase in technology imports and the skill level of the domestic labour force.⁸ This aspect needs to be even more strongly realized in the context of LDCs where there are pressing needs for technological capability building through skills development.

5. Information and communication technology

There is a wide recognition that the globalization and advances in information and communication technologies have had profound impacts on the business decisions and competitiveness of all enterprises, including FDI, regardless of size or ownership. It has also put immense pressures on enterprises to innovate, for instance, by introducing information technology in areas such as production, marketing and financial management. In particular the large-scale enterprises, including TNCs, have introduced management information systems which have facilitated their business decisions by assuring the timely flow of reliable and accurate information. As such, the use of information technology has facilitated the implementation of management techniques such as “just in time” inventory management and other working capital management techniques making the operations of the enterprise more cost effective and competitive. In addition, information technologies have facilitated access to information in all kinds of areas relevant to the operations of the

⁸ Jorg Mayer, *Globalization, Technology Transfer and Skill Accumulation in Low-income Countries*, UNCTAD Discussion Paper No. 150 (Geneva, August 2000).

enterprise, and have opened avenues for expanding products and markets, boosting both domestic and foreign investment as well as in promoting competitiveness.⁹

As globalization has boosted FDI flows all over the world, and not in the least in the Asia-Pacific region, the application of information technology has further facilitated the practice of so-called “outsourcing”. This might be explained by the fact that the use of information technology lowers transaction costs, thereby favouring “buying” to “making”. Outsourcing involves the manufacturing of components in separate locations and assemble them elsewhere. This also allows TNCs and other big enterprises to adopt sourcing of parts and components involving widely dispersed industrial plants and transmit technical and economic information among numerous information technology systems at different geographical locations.

Thus, the rapid developments in information and communication technology have been identified as the main driving force for improving competitiveness behind the globalization process, not only directly but also indirectly, as it has facilitated government decisions to liberalize and deregulate the economy and business decisions to invest overseas. In other words, with the help of information technology, ideas are translated into new processes, products and services before they make an impact on the market. It also improves the quality of design of industrial products by making them information-intensive and environmentally friendly rather than energy and material-intensive. Information technology allows the establishment of up-to-date management information systems (MIS) which enable managers to obtain quick and timely information to facilitate decision-making. In sum, information and communication technology is used extensively in various sectors in both developed and developing countries to improve productivity, efficiency, flexibility and quality and creates new business opportunities. The wider application of information technology have also facilitated the flows of FDI as well as the technological capability building. Furthermore, FDI from Asian countries has also been an important vehicle facilitating the diffusion of ICT within Asia. It decreases the cost of doing business through facilitating transaction processes, procedures and services.

C. Foreign direct investment: trends and developments

During the last few decades, the Asian economies have exhibited remarkable vigour and dynamism in which external private capital flows have played a very important role while the economic crisis of 1995-1997 have also been cited as result of such unrestricted and unregulated flows leading to currency and financial crisis, but nevertheless the overall impact of such capital flows have been remarkable in overall development process of the Asian countries.

1. Trends in capital flows

In the 1990s, there has been a significant change in the composition of external capital flows to developing countries, with the share of private capital increasing from 44 per cent in 1990 to 86 per cent in 1996 and a corresponding decline in the share of official development finance. In 1996, the Asian region received 50 per cent of private finance

⁹ OECD, *Information Communication Technology Outlook 2002* (Paris, 2002) and ESCAP, *Initiatives for E-Commerce Capacity-building of Small and Medium Enterprises* (ST/ESCAP/2261) (New York, United Nations, 2003).

going to developing economies. However, this figure was reduced to 38 per cent in 2000. Nevertheless, net private capital flows constituted more than 82 per cent of the total net resource flows to developing countries in 2000.¹⁰ Within private capital, flows of foreign investment increased five and a half times, surpassing other types of capital flows and constituting 54 per cent of total capital flows to developing countries in 1996. Asia received most of the capital inflows up to 1996 but then suffered a decline after the financial crisis of 1997. In recent years it has picked up again.

Since 1990, private capital flows have far exceeded official loans and grants to become the dominant source of external funding for many developing countries. The terms and conditions under which these countries access international capital markets thus weigh heavily on economic performance. While such accessibility could also depend on other non-economic factors such as political and other factors and the capital flows could be highly volatile, nevertheless.¹¹ Private capital flows are more beneficial since they are generally accompanied by technology transfer, managerial capability and market access in the case of FDI; a diversified investor base in the case of bonds; and a reduction in the cost of capital in the case of portfolio flows. Unlike other flows, FDI is a “package” which contains capital along with management, technology and skill and should take precedence over others. Experience in developing countries suggests that borrowing capital from international banks, purchasing technology through licences and negotiating management agreements are less efficient, in terms of gains in productivity, than “unbundling” a FDI package.

2. Trends in foreign direct investment flows

By now it is clearly evident that FDI has made a significant contribution in sustaining the dynamic performance of Asia and the Pacific region by becoming an important source of capital, technology and skills. In this regard, Japan and the capital surplus newly industrialized economies (NIEs) have appeared as the major suppliers of intraregional FDI. This development has coincided with their movement to higher level of technologically sophisticated production structures. Consequently, the FDI activities of their enterprises are beginning to make a significant contribution towards regionalization of manufacturing production and improving the basis of competitiveness of the recipient countries.

In recent years, almost all the developing countries, including LDCs, of the region have shown an appreciable increase in their awareness about the potential benefits of FDI in achieving their development objectives. At an aggregated level, FDI, particularly in the form of equity investments involving industrial relocation and complementation, add to the capital stock of the country. This increase in the supply of capital enables the recipient country to achieve faster economic growth and bring about rapid structural change. As investment in new plants, equipment, roads, transport and other forms of fixed capital take hold, the recipient country’s productivity goes up, spurring the development of a competitive industrial sector. FDI can also replenish their existing industrial capital stock and help towards releasing domestic resources for investment in physical and social infrastructure like schools, health facilities, housing, and transport and communication.

¹⁰ Asian Development Bank, *Key Indicators 2002* (Manila, 2002) tables 29 and 30, pp. 79-80.

¹¹ International Monetary Fund, *Global Financial Stability Report 2003* (Washington, 2003), chapter IV, p. 85.

Careful selection and use of FDI can bring other immense benefits to countries such as Nepal. In particular, FDI can promote the development of a more diversified manufacturing structure and export base in the country. This can help reduce its dependence on a narrow range of manufactured products to generate employment, and on commodity-based, especially agro-based, exports to earn foreign exchange.

Although agriculture will continue to be the main source of employment and output in countries such as Nepal for quite some time, its ability to provide employment to a rapidly rising labour force is reaching limits. In that regard, if FDI inflows reflect the comparative advantage of a country, then it can play a significant role in strategies to generate productive employment. As manufacturing emerges as the dynamic component in the industrial sector of developing countries with a potential for providing increased employment and generating needed investment surplus, FDI in this sector can play an important role in achieving the developing countries' twin objectives of employment creation and structural change through greater linkages between manufacturing and other sectors, and decentralization through dispersal of industrial activities and other economic activities to relatively underdeveloped areas, specially to semi-urban and rural towns.

Export-oriented FDI can also ensure greater access to foreign markets. In this regard, FDI which promotes inter- and intraregional trade provides developed countries with an opportunity to reduce their dependence on a few external markets and bring about more stability in their external account. FDI can also facilitate the transfer of management, marketing, production and organizational skills. It can create opportunities for local suppliers and contractors, and stimulate competition and efficiency.

FDI has become a major conduit for accessing and adopting most up-to-date production technologies crucial to achieve and maintain competitiveness, especially in the early stages of economic development. Opportunities for FDI-related technology transfer are rising. In instances where FDI is at least partially export-oriented, the likelihood that the foreign firms will transfer efficient production processes and up-to-date products is greater. In a labour-abundant economy such as Nepal, such investments may largely be concentrated in labour-intensive industries, using relatively simple production technologies. In such cases, the most important know-how to be transferred is likely to involve management and international marketing skills. This may prove quite valuable for local managers who have never been exposed to the requirements of competing in world markets. The establishment of linkages between the foreign-invested sector and local suppliers of materials and services can be an important source of indigenous technology strengthening.

FDI, like trade, also provides an important channel for global integration and thereby for technology transfer. FDI also promotes privatization and the provision of finance, management and technology for infrastructure development. The ASEAN experience shows that FDI can promote industrial growth, technology upgrading and export capabilities of host countries through the creation of intraregional and extra regional linkages. As regards sectoral distribution, FDI tends to concentrate in industries using mature or standardized technology and management skills. Extra efforts are required to attract those in the high-technology domain.

Furthermore, FDI has contributed to the globalization of financial markets as leading corporations set up networks of businesses, which are often quoted on the various stock exchanges in the world. Thus, in the economies of many developing countries, FDI

has made a significant contribution to economic growth, employment generation, training new skills and acquiring expertise. It has also facilitated the transfer of technology to developing countries and increased their access to international markets. However, the concentration of FDI in a few of the largest developing economies means that many LDCs such as Bangladesh and Nepal, are not able to benefit fully from the transfer of technology and access to export markets. LDCs remain heavily dependent on official development assistance, which has declined over the years. FDI flows are also subject to the vagaries of the market. In the current economic climate, there has been a significant drop in the levels of FDI to the emerging markets and developing countries, especially LDCs.

3. Recent trends of foreign direct investment flows

The recent levels of FDI flows in developing countries of Asia and the Pacific are presented in table II.2.

FDI remained stable during much of the 1990s but as the *World Investment Report 2003* indicates, FDI inflows declined in 2002 as a result of slowing down of economic growth in several parts of the world and dim prospects of recovery, but was still much higher than that of the 1980s. The decline in FDI in 2002 was uneven across regions and countries. It was also uneven sectorally: flows into manufacturing and services declined, while those into the primary sector rose. The equity and intra-company loan components of FDI declined more than reinvested earnings. FDI entering host economies through mergers and acquisitions (M&A) went down more than that through green-field projects.

The Asia-Pacific region was not spared either from the global decline in FDI inflows in 2002. FDI inflows to the region declined for the second consecutive year, from US\$ 107 billion in 2001 to US\$ 95 billion, uneven by subregion, country and industry. All subregions, except Central Asia and South Asia, received lower FDI flows than in 2001. Flows to 31 of the region's 57 economies declined. However, several countries received significantly higher flows. Intra-regional investment flows, particularly in South-East Asia and North-East Asia, remained strong, partly as a result of the relocation of production activities, expanding regional production networks and continued regional integration efforts. FDI in the electronics industry continued to decline due to rationalization of production activities in the region and adjustments to weak global demand. While long-term prospects for an increase in FDI flows to the region remain promising, the short-term outlook is uncertain.¹² FDI increased from US\$ 5 billion in 2002 to US\$ 9 billion in 2005 in South Asia. India, for example, has joined the top ten recipients of FDI in 2002 with US\$ 3.6 billion. Apart from that, in 2002, South Asia received US\$ 16 billion in remittances. This is the second highest among developing country regions and equals 2.5 per cent of the GDP for the region. For 2001, India alone, received US\$ 10 billion, thus much higher than FDI inflows, and was the largest recipient of remittances in the developing world. Other major recipients included Bangladesh (US\$ 2.1 billion), Pakistan (US\$ 1.5 billion) and Sri Lanka (US\$ 1.1 billion).

¹² UNCTAD, *World Investment Report 2003* (Geneva, 2003).

Table II.2. Foreign direct investment, 1991-2001

(US\$ million)

<i>Country/area</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
East Asia	6 816.8	12 765.3	29 028.5	35 979.2	39 193.8	44 385.9	49 354.2	64 169.1	75 624.0	114 602.3	88 180.1
China	4 366.0	11 156.0	27 515.0	33 787.0	35 849.2	40 180.0	44 237.0	43 751.0	38 753.0	38 399.3	52 344.0
Hong Kong, China	...	...	...	...	...	...	...	14 764.9	24 581.2	61 937.9	22 834.3
Republic of Korea	1 179.8	728.3	588.8	810.3	1 775.8	2 326.0	2 844.2	5 412.3	9 333.4	9 283.4	8 892.8
Mongolia	...	2.0	7.7	6.9	9.8	15.9	25.0	18.9	30.4	53.7	...
Taiwan Province of China	1 271.0	879.0	917.0	1 375.0	1 559.0	1 864.0	2 248.0	222.0	2 926.0	4 928.0	4 109.0
South-East Asia	13 399.5	12 103.1	15 928.7	20 148.6	23 717.0	26 892.2	28 573.5	19 949.7	21 599.7	10 949.6	20 934.5
Cambodia	0.0	33.0	54.1	68.9	150.8	293.6	203.7	120.7	143.6	111.7	206.7
Indonesia	1 482.0	1 777.0	2 004.0	2 109.0	4 346.0	6 194.0	4 667.0	-356.0	-2 745.0	-4 550.0	-1 445.9
Lao People's Democratic Republic	6.9	7.8	29.9	59.2	95.1	159.8	86.3	45.3	51.5	33.9	83.3
Malaysia	3 998.4	5 183.4	5 005.6	4 341.8	4 178.2	5 078.4	5 136.5	2 163.4	3 895.3	3 787.6	3 548.8
Myanmar	238.1	171.6	104.7	126.1	277.2	310.4	387.2	314.5	253.1	254.8	330.0
Philippines	544.0	228.0	1 238.0	1 591.0	1 478.0	1 517.0	1 222.0	2 287.0	573.0	1 241.0	1 620.7
Singapore	4 887.1	2 204.3	4 686.3	8 550.2	8 787.7	8 608.1	10 746.1	6 389.0	11 803.2	5 406.6	8 608.8
Thailand	2 014.0	2 113.0	1 804.1	1 366.4	2 068.0	2 335.9	3 894.7	7 314.8	6 213.0	3 366.0	5 791.5
Viet Nam	229.0	385.0	1 002.0	1 936.0	2 336.0	2 395.0	2 220.0	1 671.0	1 412.0	1 298.0	2 190.6
South Asia	391.0	749.9	1 120.4	1 587.5	2 939.4	3 511.4	4 896.9	3 547.7	3 073.4	3 089.0	4 596.8
Afghanistan	...	...	...	...	...	...	...	...	...	...	...
Bangladesh	1.4	3.7	14.0	11.1	1.9	13.5	139.4	190.1	179.7	280.4	250.9
Bhutan	0.6	0.0	0.0	0.0	0.1	1.4	-0.7	0.0	0.0	0.0	-0.1
India	73.5	276.5	550.4	973.3	2 143.6	2 426.1	3 577.3	2 634.7	2 168.6	2 315.1	3 445.1
Maldives	6.5	6.6	6.9	8.7	7.2	9.3	11.4	11.5	12.3	13.0	13.7
Nepal	2.2	4.0	6.0	7.0	8.0	19.2	23.1	12.0	4.4	-0.5	10.8
Pakistan	258.4	336.5	348.6	421.0	722.6	922.0	716.3	506.0	532.0	308.0	630.0
Sri Lanka	48.4	122.6	194.5	166.4	56.0	119.9	430.1	193.4	176.4	173.0	246.3
Central Asia	...	118.0	1 417.4	907.9	1 609.4	2 027.6	2 812.9	2 510.6	2 283.7	1 505.0	...
Azerbaijan	...	...	0.0	22.0	330.1	627.3	1 114.8	1 023.0	510.3	129.9	...
Kazakhstan	...	100.0	1 271.4	659.7	964.2	1 137.0	1 321.4	1 151.4	1 587.0	1 282.5	...
Kyrgyzstan	...	0.0	10.0	38.2	96.1	47.2	83.8	109.2	44.4	-2.4	...

Table II.2. (continued)

<i>Country/area</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Tajikistan	...	9.0	9.0	12.0	10.0	18.0	18.0	25.0	21.0	22.0	...
Turkmenistan	...	...	79.0	103.0	233.0	108.1	107.9	62.0	...	...	...
Uzbekistan	...	9.0	48.0	73.0	-24.0	90.0	167.0	140.0	121.0	73.0	...
Pacific	162.7	250.2	204.0	157.6	559.2	155.7	131.4	250.8	290.6	48.8	183.8
Cook Islands	...	...	...	...	...	...	...	...	...	...	...
Fiji	5.2	103.6	91.2	67.5	69.5	2.4	15.6	107.0	-33.2	-69.3	-23.1
Kiribati	0.4	0.4	-0.8	0.3	0.1	0.2	0.2	0.0	0.0	0.0	-0.5
Marshall Islands	...	...	...	...	...	...	...	...	...	...	...
Micronesia, Fed. States of	-	-	-	-	-	-	-	-	-	-	-
Nauru	...	...	...	...	...	...	...	...	...	...	...
Papua New Guinea	116.7	104.3	62.0	57.0	454.6	111.3	28.6	109.6	296.5	95.9	175.9
Samoa	0.0	0.0	0.0	0.0	0.0	1.2	20.0	3.0	2.0	-1.5	1.2
Solomon Islands	14.5	14.2	23.4	2.1	2.0	5.9	33.8	8.8	9.9	1.4	7.5
Timor-Leste	...	...	...	...	...	...	...	...	...	...	...
Tonga	0.4	1.2	2.2	0.9	2.0	2.0	3.0	2.0	2.0	2.0	2.6
Tuvalu	...	...	...	...	...	...	...	...	...	...	...
Vanuatu	25.5	26.5	26.0	29.8	31.0	32.7	30.2	20.4	13.4	20.3	20.1
Total (reporting)	20 770.0	25 986.5	47 699.0	58 780.7	68 018.7	76 972.8	85 768.9	90 427.9	102 871.4	130 194.7	113 895.2

Source: Asian Development Bank, *Key Indicators of Developing Asian and Pacific Countries*, 2003.

Thus, the dramatic expansion of FDI inflows over the 1990s had generated a lot of optimism among developing countries to share the benefits of deeper integration with the world economy by playing host to FDI inflows. However, the developments in 2001 and 2002 were a bit disappointing yet the emerging patterns of FDI inflows as presented above suggest that FDI boom will be fuelled by cross-border M&A as a part of the wave of corporate consolidation and restructuring. FDI inflows will remain concentrated in a handful of high and middle-income countries with 80 per cent of global FDI going to OECD countries and poorest countries could remain marginalized in the global distribution of FDI inflows. The share of developing countries, particularly in Asia, in recent years in FDI inflows has declined. The economic crisis of 1997 is partly responsible for the declining share of developing Asia. Regional economic integration has also become an important factor in determining the pattern of FDI inflows. The rather slow progress of the process of regional economic integration in Asia compared with other regions is also responsible for the declining share of the region in FDI inflows. South Asia, comprising some of the poorest economies in the region, is also increasingly marginalized in distribution of FDI inflows. Though the prospects for poorer countries such as those in South Asia, except India, for FDI inflows do not seem bright in the light of the findings of empirical studies on their determinants that bring out importance of market size and income levels, levels of urbanization and quality of infrastructure, among other factors. However, if countries could expedite policy liberalization in close monitoring of the developments at the regional and global levels, they could increase their share of FDI inflows. Some Asian countries are the most rapidly liberalizing economies in the world and facing diminished FDI inflows, many of the governments in Asia have accelerated the liberalization of FDI regimes. All in all, it is predicted that FDI flows will stabilize in 2003. Flows to the developing countries and developed countries are likely to remain at levels comparable to those in 2002. In the longer run, beginning with 2004, global flows should rebound and return to an upward trend. The prospects for a future rise depend on factors at the macro-, micro- and institutional levels. The fundamental economic forces driving FDI growth remain largely unchanged. Intense competition continues to force TNCs to invest in new markets and to seek access to low-cost resources and factors of production. Whether these forces lead to significantly higher FDI in the medium term depends on a recovery in world economic growth and a revival in stock markets, as well as the resurgence of cross-border M&A. Privatization may also be a factor. FDI policies continue to be more favourable, and new bilateral and regional arrangements could provide a better enabling framework for cross-border investment.

The determinants of FDI attraction remains basically dependent on the general level of development in the host country, strength of the national private sector, advanced factor conditions, market size and market access of the host country, availabilities of support services and industries and other specific strategies at the firm/enterprise levels. Furthermore, the issues that have been repeatedly emphasized for attracting FDI and for which host country needs to demonstrate renewed commitments through concerted actions and with clear visibilities, are of strategic urgency in LDCs such as Nepal. Issues that are conducive to such flows include good governance and transparency, sound macroeconomic conditions, and tax and fiscal policies. It also entails the development of appropriate national and/or regional institutions. For example, the establishment of national and regional investment guarantee agencies, and other multilateral investment guarantee schemes should be encouraged to provide insurance against non-commercial risks on attractive terms. Such agencies can be set up as joint

ventures with the private banking and insurance sector. Working alongside one-stop investment promotion agencies, such agencies can be effective tools in lowering the information and entry costs for investors and raising expected returns on investment, thereby increasing the potential volume and duration of investment flows.

In this context, recent studies have also clearly and empirically shown that the surge in FDI flows in the 1990s was driven to a large extent by the privatization measures undertaken by a number of countries.

Most studies find that FDI is most stable among different types of capital flows and this has contributed to the overall stability of flows until recently. In a study that relates the driving forces of FDI to the observed increased integration of capital markets, it is pointed out that the share of FDI variance explained by global (“push”) factors has increased notably in the last 15 years, from less than 10 per cent to around 50 per cent. It is also shown that the development of local financial markets contributes significantly to the growth in FDI. Furthermore, it is pointed out that important pull factors appear to be political and economic stability, the size and growth of the domestic market, the proximity of other large markets, predictable rules for investment and a sound legal framework, the ease of profit repatriation, and the availability of skilled labour and infrastructure.

Analysts have cited three major trends in the recent surge of FDI to emerging markets. First, FDI has been increasingly directed to the service sector, while it traditionally had concentrated in the natural resources and manufacturing sectors. This shift was led by the progress in privatization of state-owned assets and the large investments needed to keep up with innovations in the information technology sector.

Second, while traditionally FDI was to a large extent of the “green-field” variety,¹³ M&A – which used to be the main mode of foreign entry in industrial countries – have played a growing role in developing countries and accounted for a significant part of the privatization programmes.

Third, FDI has remained relatively resilient during the string of market crises, but a full assessment of the contribution of FDI to the stability of flows would have to consider funding, hedging, and other activities of multinational enterprises.¹⁴

D. Technological capability-building through foreign direct investment

FDI has thus played an important role in overall development process in several countries of the Asia-Pacific region. FDI impacts have been different, especially when it comes to capability-building at the national level. It is also obvious that levels of technology and quality of human resources of the country are two of the important critical factors in attracting FDI and thereby in development in general and in industrial and technological changes in particular. Industrial performances and economic development in Asia and the Pacific developing as well as developed countries have clearly shown that the pace at which industrialization proceeds and economic development progresses depend on the marked acceleration of science and technology. As advances in science and technology give rise to new knowledge, new products and new processes, will have far

¹³ A “green-field” investment involves the setting up of new units or facilities by foreign firms – as opposed to the purchase of existing ones.

¹⁴ International Monetary Fund, *op. cit.*

reaching implications for economies to move in new directions for achieving competitiveness and increased market opportunities. The present age can be regarded as a period of rapid technological innovation, and therefore one cannot conceive today's business development and national economic progress without regard to these fast technological innovations. In the post war period, several new manufacturing technologies were invented including synthetic fibres and products. Others included television and computers based on electronic and materials technologies, new chemicals, and petrochemical products. These new technologies brought important changes in the structure of industry. Thereafter, further technological innovations in micro-electronics, informatics, biotechnology, genetic engineering, new materials, and laser technology and optic fibres created new means of competition in the national and international markets. In recent years, skill-intensive and knowledge-based technologies are the most important ones. The developing countries of Asia and the Pacific, including LDCs, unless they develop the capability to acquire, adjust and adopt these technologies, would be losing grounds in international competitiveness in this period of greater integration and interdependence of global and regional economies. Sustained growth and development in all developing countries, especially in LDCs, requires that these countries quickly attain basic thresholds on a number of fronts such as sound economic governance, basic health care and education, minimum levels of core infrastructure, access to regional and global markets and most important that they build up capabilities for technological upgradation and competitiveness.

As mentioned earlier, drastic changes are already emerging in the international trade system, in the financial system, in technological parameters and in the price system for various commodities and products, which have created important challenges for developing countries, especially to maintain and enhance their technological competence and output competitiveness both in terms of quantity and quality.

Though several developing countries of the ESCAP region have advanced significantly, however, the progress in science and technology and the technological innovations as well as effective adoption of imported technologies, is still limited. This is especially the case in LDCs. The distinctive characteristics of any modern economic and industrial structure is the mass production system made possible by a combination of large-scale capital investment and highly developed technology. In this context, the importance of technological capability is absolute in development process. Furthermore, technological innovation and adaptation for small and medium-scale industries, which occupy a prominent place in LDCs, is also crucial as technologies are the source of new products and the impetus for survival and competitiveness. In this respect, LDCs of Asia and the Pacific have to further strengthen their efforts in successfully acquiring and adopting modern technologies.

1. Modes of technology transfer and capability-building

There are various channels of technology transfer and adaptation. These include FDI, joint ventures, licensing, original equipment manufacture, own-design and manufacture, subcontracting, imports of capital goods, franchising, management contracts, marketing contract, technical service contract, turnkey contracts, international subcontracting, informal means (overseas training, hiring of experts, returnees), overseas acquisitions or equity investments, strategic partnership or alliances for technology. Other modes of technology acquisition include minority interest in firms with R&D

programmes, contracts for R&D to other companies and research institutes, grants consortia, bilateral cooperative technology agreements, and buying technology embedded in products, material sub-assembly or processes. Out of these, the most popular modes are licensing, joint ventures and FDI.

The experience of NIEs also show that original equipment manufacture and own-design and manufacture have played a major role in technology adaptation and upgrading, eventually leading to independent designing and development. Furthermore, component supply through subcontracting with foreign affiliates helped domestic component producers in several host countries to enter the vertically integrated production chains of TNCs geared to export markets during the 1970s and 1990s. Subcontracting arrangements were common for consumer goods, such as electronics, footwear, furniture, garments, house ware and toys. In East and South-East Asia, networks of local producers (mainly joint ventures with TNCs) were established to supply components to automobile and electronics TNCs, with plants in different countries specializing in different areas to supply the regional market.

2. Policies and strategies for promoting a foreign direct investment-technology nexus

In all those processes and times, inflows of FDI as determined by a complex set of economic, political and social factors, and foreign investors have to be used for effective conduit for technology transfer in LDCs.

In that context, for host countries, the policy agenda for increasing FDI and technology inflows and for drawing maximum benefits from them include the following priorities: ensuring a stable economic environment conducive to sustained economic growth; encouraging the development and upgrading of local industrial and technological capabilities; strengthening infrastructure and human resource development, especially technical skills; and providing the requisite legal, regulatory and institutional set-up. Those countries, especially LDCs, that have only recently become open to FDI need to ensure that the “open-door policy” is maintained and remains stable. They should examine the possibility of a further liberalization of FDI regimes; the harmonization of FDI and related policies on industry, trade and technology; and improving the efficiency of their administrative set-ups for investment approvals. To the extent possible, host countries should seek to avoid competitive bidding, enhance exchanges of information and promote transparency in order to reduce unnecessary transaction costs.

LDCs in the region should pay particular attention to firms from neighbouring countries, so as to capitalize on growing intraregional investment. Special attention needs to be given to SMEs, whose special needs – dictated by their limited financial and managerial resources and insufficient information – may call for incentives for joint ventures among small and medium-sized TNCs.

Successfully enticing TNCs and other enterprises from outside to locate in a country can trigger a chain reaction that leads to substantial sequential and associated investment. The most obvious targets are firms already established in a country. Governments can strive to encourage sequential investment (including reinvested earnings), which can provide positive demonstration effects for potential new investors.

One of the most important determinants of a foreign affiliate's impact on technology and skills in a host country is the extent of its forward and backward linkages with local firms. FDI policy should therefore have a trade component, as TNCs are interested in the suitability of a country for inclusion in their intra-firm division of labour. At the same time, trade policy should have an FDI component to take advantage of the market access that TNC systems provide. Generally, FDI should not be encouraged either entirely for import substitution (for example, tariff incentives) or completely for export promotion (for example, export processing zones). Since FDI is a package, it should be treated as such. The composition of the package that can be attracted depends very much on a country's characteristics, including its level of development.

LDCs should focus more intensely on governance issues and accelerate efforts aimed at improving the efficiency of public sector enterprises in the provision and utility of services, cost recovery and regulatory oversight and in the establishment of a facilitating business environment. They should also undertake bold reforms in local governments and micro-levels to promote efficient decentralization for timely implementation of infrastructure and social sector programmes.

The strengthening of local capital and stock markets is essential for the development and broadening of the domestic investor base and technological capability-building. In this respect, strengthening of domestic private sector has a role to play in broadening the investment base. A prudent regulatory framework, along with transparency and efficiency of price dissemination, are necessary to ensure investor confidence.

Among the main issues to be tackled for build-operate-transfer financing schemes in infrastructure are the need to restructure some utility sectors, the need for an improved regulatory environment and measures to reduce demand risks and foreign exchange risks.

It is also essential that the developed countries supplement their domestic policies with international instruments aimed at facilitating outward FDI and technology transfer, especially targeting LDCs. They should improve FDI liberalization standards generally and encourage a level playing field among themselves.

E. Conclusions and strategies for foreign direct investment promotion and technological capability-building in least developed countries

LDCs need to fully realize that acceleration of economic development process requires much more concerted efforts at the national level through increased investments and capability-building for competitiveness. In this context, it is essential that policies and strategies as well as institutional/infrastructural facilities be reformed and strengthened. Strategies and policies have also to be modified due to changing positions of comparative advantage as a result of altering conditions in the technology, international trade and domestic demand. East and South-East Asian countries adopted open-economy policies and tried to promote exports and reduced trade barriers with significant results. The two largest economies of the Asian region, i.e., China and India, have in recent years adopted open-door policies with liberalization of their international trade and foreign investment policies. While further openness of these economies is desirable, nevertheless, it is already reaping fruitful results.

These countries have achieved remarkable progress in economic and industrial development and exports and have been able to achieve structural change in manufacturing, while LDCs still are heavily dependent on agro-based industries and exporters of primary products. These economies are facing problems of low valued manufactured products. They should attempt at strengthening their efforts towards adding value to their products through improvement of technologies, standardization and quality control. They should aim at establishing greater linkage between industry and other sectors of the economy, especially with agriculture. They should attempt at new methods of production techniques and processing for meeting international standards. Consequently, apart from NIEs already producing skill and technology-intensive products, LDCs of the region could also move more effectively towards these types of products. Such countries have already adopted open policy and several incentive measures for exports, but their technological levels need further improvements, if they really go to meet international competitiveness.

These LDCs have again and again stressed the need for attracting more FDI and for improved application of modern technologies to solve their development problems. In these contexts, the development of human resources is one of the crucial concern of LDCs in building-up the technological capability and strengthening competitiveness. It is also essential that these countries devise new ways of managing the challenges of globalization, promote integration to the regional and global levels and build-up capabilities for sustaining and improving competitiveness. In these contexts, the following measures are essential.

1. Measures for managing challenges of globalization and promoting integration

While the forces of globalization and the new economy are outside the direct influence and control of the individual economies, especially the least developed ones, yet it is very important that certain policies and measures be put in place to take advantage of the globalization process and benefit from the resulting outcomes of FDI inflows and technological capability build-up.

In that context and in order to participate effectively in the globalized economy, a certain degree of stability in macroeconomic parameters such as price level and flexibility in policy instruments such as the exchange rate and interest rate is needed in LDCs such as Nepal.

Liberalization of international trade and investment regimes needs to be expedited as a means to encourage inflows of new ideas, skills and technologies and also to capture the gains from trade and investment. In this regard, a change in emphasis from excessive dependence on foreign borrowings in favour of FDI and within the latter, emphasis on green-field investments is required. At the same time, hasty liberalization of the financial sector should be avoided.

It has become apparent that ICT is the main defining element of the new economy. As such, the application and utilization of ICT in trade and investment is also a major aspect of boosting national competitiveness. Therefore, LDCs need to implement policies and strategies for the effective application and utilization of ICT so as to maximize the benefits they can derive from the globalization process. It is also important to ensure a

significant rise in the allocation of national resources towards promotion and capacity-building for ICT so as to widen and deepen its use across all sectors of the economy.

Policies restructuring human resources development towards higher value-added industrial sectors and some form of R&D to encourage technology transfer and adaptation should be introduced in order to maintain international competitiveness of industries. Special attention should be given to capacity building of SMEs, particularly those in the dynamic export-oriented manufacturing sector and in the services sector. The recent experiences in South-East Asia show that SMEs have adjusted to the crisis quickly, and absorbed a large number of displaced workers in the crisis affected countries, thus demonstrating that SMEs can provide a form of social safety net.

One of the important lessons learned recently from the experiences of NIEs and other developing countries is the need for national institutions to deal effectively with the challenges and risks associated with growing interdependence and globalization. This need is clearly seen in the promotion of FDI and in the financial sector, in particular the banking sector in LDCs. These countries do not have effective national institutions to manage matters related to FDI promotion and also to trade policy reforms in the context of WTO. Hence, there is an urgent need for creating such institutions and strengthening their capacities.

2. Measures for promoting foreign direct investment

Like other developing countries, LDCs are also going through a phase of economic liberalization that provides a solid foundation for the success of intra- and interregional cooperation. They need to make greater efforts to create a more liberal trading and investment environment in order to reduce wide disparities in the levels of income and market size and to share the distribution of benefits. The following measures could promote FDI in these countries:

(1) Since FDI has increasingly become market-driven, LDCs would increase their locational attraction if closer linkages were established with neighbouring countries in order to generate larger markets and complementary locational advantages. Such an approach could also facilitate the technology-exchange among neighbouring countries. The regional integration could be used as strategy to overcome the limitations of market size. Furthermore, since almost all countries in the Asian and Pacific region are trying to attract FDI, a great deal of competitive overbidding and unnecessary loss of resources could be avoided through some harmonization of FDI policies among different governments;

(2) Instead of competing for foreign capital, LDCs could undertake appropriate policy and institutional reforms which will not only encourage more savings and investment internally but also help in augmenting capital flows to the Asian region;

(3) At the regional level, LDCs should cooperate with one another to modernize their financial systems to cope with increase in trade and cross-border capital flows. They should try their best to facilitate intraregional funding and to reduce the impact of any global credit crunch;

(4) The sheer magnitude of investment required for technological R&D calls for subregional pooling of limited resources (financial, physical and human) to obtain the best

possible leverage. Attempts should be made to evolve common R&D institutions at the regional level;

(5) It may be desirable to establish a regional investment guarantee facility. A major problem in attracting investment funds to developing countries, especially in LDCs, is the perceived risk of confiscation, civil strife and political turmoil;

(6) Another aspect of regional cooperation that is of growing importance is the sharing of information, particularly on methodologies for creating and maintaining efficient human capital, infrastructure and technological capabilities. Regional cooperation can reduce the transaction costs of gathering and utilizing information, and through economies of scale, can reduce R&D costs. In this respect, the Regional Investment Information and Promotion Service (RIIPS) and the Asian and Pacific Centre for Transfer of Technology (APCTT) under the auspices of ESCAP could make significant contributions. However, there is still sufficient scope for improvement in evolving data banks and regional information networks on FDI opportunities and technological capabilities in the region;

For LDCs where there is a lack of capacity to undertake comprehensive efforts to develop local capacity, there is an urgent need for more active support by the donor community in such areas as strengthening the private sector and local entrepreneurship, building institutional capacity, improving physical infrastructure and enhancing human resources development. On a broader level, regional financing institutions and development banks could play complementary roles in enhancing regional cooperation to attract more private international capital into the Asian and Pacific region. Such institutions should expand their catalytic role in private sector financing. Other multilateral financial institutions will also have to strengthen their catalytic role through co-financing and guarantee with a view to encouraging participation of private capital in the development process.

The efforts of low income countries and LDCs in attracting FDI inflows may be more successful if they target the flows originating in emerging sources such as NIEs and other developing neighbour countries, rather than those originating in the more conventional sources viz. industrialized countries.

3. Measures to strengthen technological capability-building

It is quite commonly recognized that FDI may have both direct and indirect impacts on local technological development. There are still intensive discussions, however, with regard to the extent and even the consequences of such impacts. Positive consequences from the direct impact may occur through the contribution to higher factor productivity, changes in product and export composition, R&D undertaken by foreign affiliates, the introduction of organizational innovation and improved management practices, and employment and training. Indirect impacts may occur through collaboration with local R&D institutions, technology transfer to local downstream and upstream producers, the effects of the presence of foreign affiliates on competition and on the efficiency of local producers and the turnover of trained personnel.

In these respects, trade and FDI inflows will help to a large extent in building up technological capabilities, as the process of building technological capabilities is rather complex and local enterprises have to learn many new factors. The process involves time, effort, cost and risk and complex interactions between firms and between firms and institutions. It is highly sensitive to the incentive environment (macroeconomic policies, trade and industrial regimes) and to the availability of factors such as skills and information. The costs and risks of learning differ by technology, with complex technologies involving much higher costs than simple ones. The process is a cumulative and evolutionary one, building upon many choices and experiences. In the following paragraphs, first the trade-technology and then investment-technology linkages, as ways of promoting technological capabilities are presented. Thereafter, specific measures for technological capability building through FDI promotion are presented.

It is quite evident that the new paradigms of production and overall development process is not only leading to new ways of doing things, but also to intensifying the severe pressures of competitiveness and sustainability. It has been very correctly pointed out that a new “paradigm” of production is emerging which involves not only new technologies (in the traditional sense), but also new management and organizational techniques, different forms of linkages between enterprises, and tighter relations between industry, pure science and flows of information between economic agents. It also involves a much larger role for such international factors as trade and capital movements. Trade is playing an increasing role in the economic life of nearly all nations, and investment flows are rising faster than any other economic aggregate. The shrinking of economic space that results is making for deep structural changes in the global economy and in patterns of comparative advantage. But their effects are very unevenly distributed across the developing world, with some countries participating strongly in the emerging system and others increasingly marginalized.¹⁵

The ability of developing countries including LDCs to receive, transfer, adopt and develop technologies, and manage them will depend on the extent of the development of endogenous technological capability and human resources. The transition to more cost-effective, competitive methods of production requires a deeper understanding of the entire production process and of the managerial and technological systems involved. The issue for many countries has less to do with access to a particular technology but more with the process of technological transformation and sustainable capability-building. As capacity for handling the “software” part of the technology package has become a key requirement, a more sophisticated education and training of firm managers, engineers and other senior staff involved in the generation of technological innovations is needed to understand the link between technology performance, competitiveness and environmental benefits.

(a) Trade-technology linkage

The positive effects of trade on technological capability building can be analysed and explained both in terms of exports and imports.

On the export side, when enterprises are exposed to the international markets, they are provided with the opportunity and the incentive to improve on existing technological capabilities in order to compete with the products manufactured under best available

¹⁵ Sanjaya Lall, *Science and Technology in the New Global Environment*, in collaboration with UNCTAD (New York, United Nations, 1995) p. 3.

production technologies and management techniques.¹⁶ The incentives work in three ways:

(1) Necessity to compete in foreign markets encourages the enterprises to upgrade the quality of their products or to lower their production costs. Foreign markets can serve as an important source of information about the quality level of the competitive products, different tastes of customers, and worldwide market trends. The acquisition of market and product information can be done by the enterprises themselves, but often the importers and buyers in foreign markets supply engineering blue prints and specifications and important feedback on the quality and performance of the products.

(2) The foreign exchange that is generated through export can be utilized to import capital equipment, intermediate inputs, and technological information that can help upgrade the product quality and lower production costs, hence, raise the competitiveness of the manufacturing sector.

(3) The manufacturing enterprises can broaden their market horizon dramatically and, therefore, raise the returns on investment in the improvements of technological capabilities.

By engaging in export to foreign markets, the enterprises are able to receive various market signals and are encouraged to improve their competitiveness.

On the import side, there are two ways that trade stimulates technological progress. One is through the import of capital goods. The technology embodied in the advanced manufacturing facilities improves and upgrades the technological level of the production. The success of the export-oriented economies such as the Republic of Korea, Taiwan Province of China and, in recent decades, China, was attributed partly to the easy access to foreign capital goods by the exporting enterprises in spite of the relatively high protection of their domestic markets. In these cases, the import had a direct impact on technological progress.

The other way is through the import of other manufacturing products. Although the impact works more indirectly, it is worth paying attention to it. The availability of imported products generates greater competition in the domestic market. The customers are exposed to internationally competitive products and acquire a larger choice. In order to compete with imports, domestic manufacturers now have incentives to upgrade their product quality or lower production costs. Through imported products, important market and technological information is made available for domestic manufacturers. It is made possible without going into foreign markets. The availability of more advanced products may make technological acquisition through copying or reversing engineering easier. In these ways, the opening of the domestic market can serve the technological progress through greater competition.

¹⁶ ESCAP, *Promoting International Competitiveness and Efficient Resource Utilization in Manufacturing in Asia and the Pacific – Proceedings of the Regional Seminar, 17-21 December 1991, Beijing*, (ST/ECAP/1237) (Bangkok, 1991) chapter I.

(b) Investment-technology linkage

The positive effects of FDI on technological progress are dependent on the objectives pursued by the host countries. Most of the time, FDI is promoted only along the lines of capital formation and employment generation, with disregard to other national capability building measures. This thinking is however changing.

The TNCs that make investments certainly bring their technological capabilities with them. Whether their intention is either to export back to their own country market or to some third country markets, the production facilities and the related knowhow still have to be a relatively high level so as to manufacture the “world standard” products that can successfully compete in the respective markets. Therefore, FDI in those cases brings competitive technology in export-oriented enterprises since foreign companies often have to transfer their most recent technology where there is an open competitive environment in the local market. The question here is whether the technologies of the TNCs will be transferred to local population and the local technological capabilities will be enhanced. When locally manufactured products of the TNCs are sold simultaneously in the domestic market, the same technology enhancing effects take place as in the case of import.

The direct effect of technology acquisition in host countries occurs for local population who are employed by, at least partially, export-oriented TNCs. Before the actual manufacturing start, those both skilled and unskilled workers and also those in management position may receive instructions and trainings either locally or abroad by the TNCs. Even though these formal trainings may not be available, the local managers and employees gain hands-on experience on on-the-job training after the operation starts. Turnover of experienced personnel to local manufacturers certainly enhances local technological capabilities but more important is the strengthening of technological capabilities of those in the TNCs. They are exposed to the managerial and technological skills that were not available in the absence of TNC investment. Consequently, investment contributes to the strengthening of the human resource base for industrial development.

Another effect of the presence of TNCs on local technological capabilities is on upstream producers. The TNCs make linkages with local suppliers of materials, parts and components, and services to some extent. By requiring quality that meets their own needs, the TNCs contribute to raising the capabilities of local suppliers. Some corporations are known to try to establish close linkages with local suppliers by providing technical knowhow and specifications, and even necessary financing in some cases. Of course, whether this type of local supplier linkage develops or not depends greatly upon various factors such as the existing technological levels of local suppliers and the government policy on local content, since the TNCs try to keep and constantly upgrade their own competitiveness.

Those above mentioned factors will be successful only if certain basic conditions are present. As mentioned earlier, the most important one is the skills formation through appropriate programme of human resources development. It is a well established fact that technological upgradation through various means including FDI inflows are necessary not only to move in new competitive fields but also to continuously improve productivity and competitiveness in the existing units. Furthermore, the capacity to examine alternative technologies suitable for enterprises has to be built at many points and institutions, and cannot be established in a short time, or designed only for a specific problem or branch.

Many components enter in the building of technological capacities, starting from the educational system, the industrial and technological research institutes, the advisory and consultancy services, the design experimentation, testing and analysis centres and project preparations, evaluation and feasibility studies. The technological capacity depends also upon the establishment of appropriate programmes of R&D, and availability of information about alternative technologies. Institutions and mechanisms are required to identify problems and difficulties in production so as to seek technological solutions for them, and in addition develop technological knowledge and ideas into full practical applications.

As a general conclusion it may be stressed that technological upgradation and capability building in LDCs will call for an accentuation of the level of and shifts in the pattern of human resources development. Skill requirements in industry, in service institutions, in governmental organizations and other enterprises will grow and need to be treated as a key prerequisite for and key element of the comparative and competitive advantages of the countries' overall progress. Development of human resources cannot be treated as a residual in the development process and has to be "tagged on" to advance the technological capabilities. It is a prerequisite for the advance of technology and the identification and pursuance of new opportunities which are made possible thereby.

Thus, it is possible to build up technological capability through FDI inflows, provided the above mentioned factors are present or created.

III. TECHNOLOGY TRANSFER IN SMEs: PROBLEMS AND ISSUES IN THE CONTEXT OF NEPAL

*Chiranjibi Nepal, Bishwa Raj Karki and Kabya Prasad Niraula**

A. Introduction

The promotion of small and medium enterprises (SMEs) is considered as a prominent approach to sustainable development. This sector mobilizes scarce resources and caters the needs of fragmented domestic market in the least developed country (LDC) economies. Thus, SMEs have remained one of the most important sectors for any nation of this region that contribute significantly to the gross domestic product (GDP), create employment and earn foreign currency through export.

Various studies conducted in the past have indicated that usually in the developing countries, SMEs are found to contribute 40-60 per cent of the total output or value added to the national economy. Emphasis to be given in the promotion and development of SMEs in LDC is much more urgent where about 50 per cent people are unemployed

The SMEs in LDCs, producing products and services with moderate quality applying to a great extent outdated technologies, have been facing tough competition with the imported product and situation may further be worsened in the days to come because they have to compete with international competitors due to trend in globalization, the widening free trade and phasing out of tariff barriers. The changes that have been taking place in the international economic scenario have definitely brought challenges for the SMEs. However, these same changes at the same time have opened up tremendous business and market opportunities for this sector.

In most LDCs, the problems faced by SMEs are more or less similar in nature. The major problems and constraints faced by them are in the field of policy and legal framework, finance, entrepreneurship, management, socio-cultural values and of course technology.

One of the main factors that influences in the success or failure of enterprise is technology. The best use of technology no doubt enables enterprise in reducing cost of production, maintain consistency in quality, improve productivity and finally develop the competitiveness of the enterprise.

Most LDCs, in fact, are aware of the importance of technology but found it irrelevant in the process of transfer of technology. SMEs in LDCs are heavily dependent on the imported technology and they remain always dependent on imported skills for the maintenance and operation of plant. This is happening because these countries have not given proper thought to technology transfer process. Adaptation to the local needs has always been of less priority. National budget allocated for technology transfer and

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development is quite low in these countries whereas, technology transfer and development process requires huge investment and adequate infrastructure.

1. Concept of technology transfer and development

Technology transfer is the use of knowledge and when we talk about transfer of technology, we really mean the transfer of knowledge. Transfer does not mean movement or delivery; transfer can only happen if technology is used. So, it is application of technology and considered as process by which technology developed for one purpose is used either in a different application or by a new user. Technology transfer is usually considered as dissemination of information, matching technology with needs and creative adaptation of items for new uses. In many LDCs, the concept of technology has to be made clear among concerned stakeholders through organizing workshops and seminars. It equally applies in the context of Nepal too.

2. Small and medium enterprises in Nepal

SMEs have been an important foundation of industrial development in Nepal. Even before the initiation of the process of industrialization in 1936, SMEs especially the cottage industries were the basis of supply of processed products of the country. The advent of democracy in 1951 introduced the planned development process even though the actual practice started from 1956. The plans and policies developed since then laid emphasis on small and cottage industries but no economic plans or industrial policies gave due emphasis on the SMEs sector as foundation of organized development. Considering the fragmented market, geographical situation and limited resources, Nepal has less choice other than to promote SMEs with comparative advantage especially small and cottage enterprises.

3. Socio-economic situation of Nepal

Nepal has been facing a problem of fast population growth (23.15 million) estimated to be in the range of 2.2 to 2.5 per cent on the one hand, on the other, it has an annual per capita at \$US 230 with an average economic growth rate is 3 per cent. During the past four decades of planned development in Nepal, the proportion of the population dependent on agriculture and non-agriculture sectors have not changed significantly and is in the ratio of 80 to 90 versus 10 to 20. Limited agricultural land and natural resources to support the growing population signifies serious social and economic problems associated with the weak capacity of the manufacturing and service sectors of the economy in absorbing the surplus population which is increasing in the agriculture sector. The situation is quite worse in the rural economy of the country. Thus, promotion and development of sustainable and local resources-based micro and small enterprises might be a reliable option the country has.

Substantial efforts are needed to lead our economy from subsistence to market-oriented production and from subsistence-based to an enterprise-based production pattern with enough emphasis on comparative advantage of the regions. Enterprise development, even in-products with comparative advantages and unique opportunities, is severely constrained in the absence of technology development and transfer mechanism. Access to markets is, of course, the main problem and niche-based products are often new and

markets have to be developed for them, which is also not an easy job. All of these also demand marketable products or services which are nowadays possible only by applying technologies that are cost effective and assurance about quality of products and services.

Nepal has a policy issue on how to promote a broad-based economic growth with built-in system of income distribution. SMEs, which account for 90 per cent of all enterprises, employ 95 per cent of the non-agriculture workforce, and contribute 50 per cent of the industrial GDP, are definitely the means to attain this goal.

4. Classification of industry

Large industries: industries with fixed assets of more than 100 million rupees shall be termed as large industries.

Medium industries: industries with fixed assets between 30 million rupees to 100 million rupees shall be termed as medium industries.

Small industries: industries with fixed assets up to an amount of 30 million rupees shall be termed as small industries.

Cottage industries: traditional industries that utilize specific (indigenous) skills or local raw materials and resources, labour-intensive and are based on national tradition, art and culture and industries with fixed assets up to 200,000 rupees shall be termed as cottage industries.

Many organizations involved in the promotion and development of micro-enterprises have defined it in different ways and forms. Some of them have defined it based on the number of employment whereas others have focused on volume of investment.

It has been mentioned that the micro-enterprise sector by contrast is less well defined; there are only rough estimates of its size. In general, the micro-enterprise and cottage and small industries sectors can be similarly characterized as owner-managed, with limited division of labour and using primarily family labour, and by informal relations with clients, including suppliers. Although the number of employees (less than 10) does not clearly distinguish the micro-enterprise sector from the small and cottage industries sector, the Government has defined the cottage industries as including those businesses with fixed assets up to 200,000 rupees with other characteristics mentioned above. Micro-enterprises are defined as those with fixed assets of less than 100,000 rupees.¹

Similarly, Industrial Enterprise Act has classified industries as:

Manufacturing industries: industries that produce goods by utilizing or processing raw materials, semi-processed materials, by-products or waste products or any other goods.

¹ Geoffrey Peters and others, *Microenterprise Services in Nepal: Recommendations for USAID Involvement*, GEMINI Technical Report No. 97 (New York, PACT Publications, September 1995).

Energy-based industries: industries which generate energy from water resources, wind, solar, coal, natural oil, gas, biogas or any other forms of such resources.

Agro and forest-based industries: enterprises mainly based on agriculture or forest products such as integrated sericulture and silk production, horticulture and fruit processing, animal husbandry, dairy industry, poultry farming, fishery, tea gardening and processing, coffee farming and processing, herbs processing, vegetable seed farming, mushroom farming, vegetable farming or processing, tissue culture, green house, bee keeping, honey production, rubber farming, floriculture, and forestry-related enterprise such as lease-hold forests, agro-forestry etc.

Mineral industries: mineral excavation or processing thereof.

Tourism industries: tourism, lodging, motel, hotel, restaurant, resort, travel agencies, skiing, gliding, water rafting, cable car complex, pony-trekking, trekking, hot air ballooning, para sailing, golf-course, polo, horse-riding, etc.

Services industries: services industries include workshop, printing press, consultancy service, ginning and bailing business, cinematography, construction business, public transportation business, photography, hospital, nursing home, educational and training institution, laboratory, air services, cold storage, etc.

Construction industries: industries such as road, bridge, ropeway, railway, trolley bus, tunnel, flying bridge, industrial/commercial and residential complex construction and operation.

5. Cottage and small industries

The number of cottage and small industries registered from the year 1997/98 to 1999/2000 is in increasing trend, however, the pace of increment is quite slow. In the year 2000/01 the industrial registration is in decreasing trend. Same impact can be observed in total capital investment. However, in the case of employment and annual production, the trend is slightly in the negative side despite the increased number of registration.

Table III.1. Registration of small and cottage industries

<i>Year</i>	<i>Number of industries</i>	<i>Total capital investment (in lakhs)</i>	<i>Annual production (in lakhs)</i>	<i>Employment</i>
1997/98	9 650	8 960	20 800	93 081
1998/99	9 990	9 620	19 290	89 164
1999/2000	10 127	10 340	NA	NA
2000/01	6 587	4 820	NA	NA

Source: Central Bureau of Statistics, 2002, Kathmandu.

It does not mean that all the industrial registrations are in operation. According to a survey report of the Department of Cottage and Small Industries (DCSI), Ministry of Industry, Commerce and Supplies, only 25 per cent of the total registered industries are estimated to be in operation. Besides these, most of the micro-enterprises which are in operation are not registered.

6. Contribution of small and medium enterprises

According to the latest Census of Manufacturing Establishments covering industries with 10 and more labour force, out of a total of 3,557 of such establishments, 3,485 (89 per cent) were SMEs with less than 50 million rupees worth of fixed assets investment, which, in turn, accounted for 87 per cent of employment.²

In terms of the size of the fixed assets, SMEs are found to be labour-intensive in nature that constitute about 40 per cent of the total gross fixed assets and the large industries constitute 60 per cent of the assets. Similarly, SMEs contribute 63 per cent of the total manufacturing value added.³

In Nepal, most of the micro and small industries are located in rural areas. Small manufacturing industries have been providing gainful employment to a large number of people. This sector also accounts for a large share of industrial output and plays an important role in the export sector.

In 1991/92, the manufacturing sector contributed 8.85 per cent to the GDP and in 1998/99 about 10 per cent. It provided employment for 5 per cent of the total labour force and GDP increased from 4.61 per cent to 10 per cent over a decade. This clearly indicates that the contribution of small manufacturing sector to the national economy has gradually been increasing overtime.⁴

7. Private sector

Realizing the important role of the private sector in technology transfer and development, the Government has strongly emphasized on private sector development in its policy guidelines. A strong private sector is considered capable to face the changes that have come up mainly due to rapid pace of globalization. The private sector-led economic development has been proved the most effective way and sustainable as well. To develop the industrial sector and attract foreign direct investment, availability of skilled human resources is prerequisite together with entrepreneurial initiatives and disciplined labour force. For it, sound measures need to be initiated so as to develop and update human resources leading to overall competence enhancement with active private sector participation. This is equally applicable in the context of Nepal too.

“It is important to understand that in a world's product competitive map the political boundaries have largely disappeared because people want to buy the best and cheapest products – no matter where in the world they are produced.”

² Central Bureau of Statistics, *Census of Manufacturing Establishment 1995* (Kathmandu).

³ *Ibid.*

⁴ Institute for Integrated Development Studies, *Strategic Alliances in SME Sector in Nepal* (Kathmandu, February 2000).

B. Organizations involved in technology transfer and development

1. Overview

There is no strong institutional mechanism for technology transfer in the SME sector in Nepal. Nevertheless, many organizations are found involved, in some way or the other, in the field of technology transfer and development in general. Such organizations can be found in the government, non-government and private sectors. But the majority of them are involved basically in skill development training for cottage and micro-enterprises level. Based on the human resources and physical infrastructures available, a few of them (such as the Royal Nepal Academy of Science and Technology, Research Centre for applied Science and Technology, Nepal Agricultural Research Council) seem to be capable to have significant contribution in this field. But these organizations are reported to be modestly functioning due to financial constraints. It is observed that national priority areas for science and technological research and development (R&D) have not yet been adequately determined. On the other hand, the science and technology related organizations are not in a position to contribute significantly even in areas indicated by the state policies due to lack of adequate budgetary support from the Government. Their yearly budget reveals that the fixed cost is far more than that of programme budget. As a result, even the capable public sector organizations appear to have involved in donor-supported small projects (international non-governmental organizations' aid projects) as and when asked for, rather than working on a long-term basis on the national priority areas.

Despite the non-existence of strong technology transfer mechanism within the country, there are many examples of technology transfer and foreign investment in public as well as private sector companies. The technology transfer in public companies was arranged through government-to-government agreements, while such agreements in the private sector are found to have materialized through negotiations between technology recipient and provider companies.

Though not directly related to the SME sector, technology development and transfer/diffusion in the alternative energy sector in Nepal appears to be remarkable. These technologies, particularly include the bio-gas, solar power and micro-hydro power plants, spread to several districts in Nepal. Spread of these technologies has been made possible from various foreign assistance projects.

Short description of the activities of some national level technology related institutions/organizations is given in the following.

(a) Ministry of Science and Technology

The Ministry of Science and Technology is the apex body within the Government in the field of science and technology (S&T) development in Nepal. It is learnt that the Ministry is in the process of formulating S&T policy. There are some foreign assistance projects which are affiliated with this Ministry. However, there is no technological infrastructure established yet within it.

(b) Royal Nepal Academy of Science and Technology (RONAST)

This academy was established in 1982 for contributing to the development of the nation from the S&T sector. However, its contribution to industrial development is not noticeable. Although, the human resources of RONAST consist of a number of scientists and technical experts in different scientific disciplines, it is reported that the academy is not able to contribute significantly in the field of technology development and transfer due to budgetary constraints. The academy is occasionally involved in small donor supported projects in the field of alternative energy and other technology development.

Some of RONAST's technological projects include:

- Solar photo-voltaic pump and lighting system;
- Biomass brequetting technology from solid fuel;
- River boat (used in Ghatbesi, Trisuli River).

(c) Research Centre for Applied Science and Technology (RECAST)

RECAST was established in 1976 under Tribhuvan University with an objective of undertaking research and development in the field of S&T. It has human resources as well as fairly developed physical facilities (laboratories) for some specific scientific work. Despite the availability of physical as well as human resources, it is learnt that the Centre could have made significant contribution in technology transfer and development, particularly in the SME sector. It is reported that the Centre is not in a position to conduct research programmes due to budgetary constraints. Some of the Centre's work on S&T include:

- Energy: solar, bio-mass, bio fuel, improved cook stove, water turbines;
- Food technology;
- Building materials and low cost housing;
- Natural dye, etc.

(d) Nepal Agricultural Research Council (NARC)

NARC was established in 1990 for the research and development in the agriculture sector. The Council has physical and human resources (scientists) in different disciplines of agriculture science. Obviously, the Council's research activities are focused on agriculture field, hence there is not much contribution made to the SME sector. However, the Council can possibly make substantial contribution to agro-based industry development (e.g. mushroom, bee-keeping, horticulture, etc.) in the country. The Council is basically a research and development organization, and the research findings and knowledge are disseminated through different departments and offices of Ministry of Agriculture and other related organizations.

(e) Technology Transfer and Development Project (TTDP), Ministry of Industry,

Commerce and Supplies

This project was established under the Ministry of Industry, Commerce and Supplies (MoICS) in 1996 with an overall objective of providing services to the industrial sector in technology-related field. Due to lack of necessary budget, human resources and infrastructure, the project could not achieve its objectives effectively. The project was merged within the Industrial Enterprise Development Institute (IEDI) in 2002. Since its merger with IEDI it has conducted some awareness workshops, and a technical need assessment study of small and micro-enterprises in the food industry sector in the Kathmandu valley. It is also modestly functioning due to the similar problems mentioned above.

(f) Other organizations

Apart from the above, there are a number of organizations in the public, non-governmental organizations and the private sector involved in technology improvement in enterprises as well as in other areas. Giving details of all of them is out of the scope of this paper. To name few of them, the Department of Cottage and Small Industries and Cottage and Small Industries Development Board under MoICS have network all over the country, and are involved primarily in technology transfer through skill development training programmes. Similarly, the Intermediate Technology Development Group (ITDG) is one of the international non-governmental organizations which is mainly involved in the alternative energy, food industry and rural transportation sector. Furthermore, the Asia Network for Sustainable Agriculture and Bioresources (ANSAB), a non-governmental organization involved in the bio-resources conservation, is actively engaged in non-timber forest products-based enterprise promotion through dissemination of technical and market information to the small entrepreneurs. But most of these organizations are primarily involved in skill development training programmes, and lack adequate physical infrastructure and human resources (technologists/scientists) for technology transfer (from abroad), adaptation and innovation.

2. Technology transfer in the Nepalese industrial sector

(a) Legal provisions

As part of the modernization drive the country has opened to direct foreign investment and other types of technology transfer from abroad. Legally speaking the only law that governs technology transfer (from foreign countries) in Nepal is the Foreign Investment and Technology Transfer Act 1992, which has laid down the regulations and rules governing foreign investment and technology transfer.

This Act defines technology transfer as any transfer of technology to be made under an agreement between an industry and a foreign investor on the following matters:

- a. Use of any technological right, specialization, formula, process, patent or technical know-how of foreign origin;
- b. Use of any trademark of foreign ownership;

- c. Acquiring any foreign technical, consultancy, management and marketing service.

Looking at the definition adopted by the Act, technology transfer encompasses a broad range of know-how transfer including management and consultancy services. However, the Act appears to be more focused on foreign investment than on technology transfer as such.

Except for the legal provisions contained in the above Act, there is no other legal framework that governs and promotes technology transfer to Nepal. However, it is learnt that S&T policy is being formulated by the Ministry of Science and Technology.

A number of facilities and concessions have been provided to foreign investors as per the Foreign Investment and Technology Transfer Act. Such facilities include:

- Except for the projects listed in the negative list, 100 per cent equity participation by foreigners is allowed in almost all sectors. The industries listed in negative list are cottage industries;
- Technology transfer is allowed even in projects where foreign investment is not allowed;
- Firms established with foreign participation are treated equally as 100 per cent Nepalese-owned firms;
- Interest paid on loans obtained from foreign source is tax free;
- Income from royalty and technical management services is levied a standard tax rate of 15 per cent;
- Residential and business visa is provided for foreign investors and their dependents;
- Non-nationalization of industry is assured;
- Provision of dispute settlement between the contracting parties;
- Expatriate employees in firms with foreign equity can take back up to 75 per cent of their salary income abroad.

(b) Status of technology transfer and foreign investment projects

Most of the technology transferred to Nepalese industries in the past were in the form of turnkey plants to the state sector, financed through international aid and/or loans. However, in the latter years, many large and medium-scale industries have been established with foreign collaboration in the private sector as well. **This has taken place through a variety of mechanisms such as direct foreign investment via joint ventures, technical collaboration, import of machinery and equipment, technical assistance through human resources, etc. While these are more formal modes of technology transfer, a lot of technology gets transferred informally through books, journals, promotional literature and personal contacts.**

As many Nepalese industries, particularly in the small and cottage industry sector, use Indian machinery and equipment, the informal mode of technology transfer is more prevalent in such industrial units. It is difficult to find out, thus, not only the level and extent of informal technology transfer, but even the numbers of such units, as the details regarding technology transfer are not found in the government records. The only data available relating to technology transfer agreements are of the companies for which permission is sought under Foreign Investment and Technology Transfer Act.

(c) Number and category of projects

According to the statistics of the Department of Industries, MoICS, a total of 859 projects with foreign collaboration (financial and technical) have been approved so far. The following table highlights the category, number, type of collaboration and scale of the projects.

Table III.2. Number and category of projects with foreign collaboration

<i>Category</i>	<i>Number of projects</i>	<i>Equity only</i>	<i>Equity + technology</i>	<i>Technology only</i>	<i>Scale</i>		
					<i>Small</i>	<i>Medium</i>	<i>Large</i>
Manufacturing	419	338	39	42	269	98	49
Agro-based	14	13	0	1	9	5	0
Energy-based	14	14	0	0	2	1	10
Construction	17	15	2	0	8	5	3
Mineral-based	3	1	1	1	1	0	2
Services	186	176	3	7	141	32	13
Tourism	206	196	6	4	154	22	30
Total	859	753	51	55	584	163	107

Source: Department of Industries, Ministry of Industry, Commerce and Supplies, Kathmandu.

Out of these 859 projects, 55 involve technology transfer while 51 projects involve both equity and technology transfer agreements. Investment in most of the projects (753 projects), however, is arranged under “equity only” agreement. **From the above table, it is evident that around 12 per cent of the projects involve technology transfer, and the rest are only financial collaboration among the concerned firms/parties.**

The country-wise data of foreign investment projects in Nepal shows that around 33 per cent projects (282 projects) are from India, while Japan stands at the second position with 91 projects (around 11 per cent). A total of 45 countries so far have been involved in foreign collaboration in Nepal. The following table depicts the country-wise status of projects (with 10 and more projects).

**Table III.3. Status of foreign investment projects by country or area
(with 10 and more projects)**

<i>Country/area</i>	<i>Number of projects</i>
Bangladesh	10
China	82
France	21
Germany	38
Hong Kong, China	12
India	282
Italy	13
Japan	91
Pakistan	10
Republic of Korea	41
Singapore	10
Switzerland	18
United Kingdom	29
United States of America	87

(d) Operational status of the projects

Looking at the operational status, around 40 per cent of them are operational. The following table shows the latest status of foreign investment projects in Nepal.

Table III.4. Status of foreign investment projects

<i>Status</i>	<i>Number of projects</i>
Operational	340
Under construction	47
Licensed	152
Approved	227
Closed	22
Cancelled	71
Total	859

Source: Department of Industries, Ministry of Industry, Commerce and Supplies, Kathmandu.

(e) Sector-wise status of the projects

The sector-wise list of projects under Foreign Investment and Technology Transfer Act 1992, shows that the majority of the projects fall under manufacturing industries followed by hotels and resorts. In the manufacturing sector, around 33 per cent are textile and ready made garments. The following table depicts the number of foreign investment projects (sector-wise).

Table III.5. Number of foreign investment projects, by sector

<i>Type of industry</i>	<i>Number</i>
Agriculture and forestry	13
Manufacturing:	423
Food, beverage and tobacco	74
Textile and ready made garment	140
Wood and wood product	6
Paper and paper product	20
Chemical and PL product	76
Non-met MI product	15
Basic metal product	24
Fabric metal, M/C	51
Other manufacturing units	17
Electricity, water and gas	18
Construction	27
Hotel and Resort	204
Transport and Communication	24
Housing and apartment	17
Service industries	133
Total	859

C. Problems and issues of technology transfer in Nepalese small and medium enterprises

There are a number of problems that hinder technology transfer and development in Nepal. Particularly important in this context is the information about the requirements for foreign technology in Nepalese industry and the problems associated with the transfer process, such as options, conditions, absorption and diffusion.

1. Lack of technology assessment mechanism

It is important to point out that technology transfer is not simply the importation of a technological system to a country. Therefore, the problems involved with technology transfer are not only related to the purchase of hardware or the contractual agreements for supply of technology, but are also linked to the country's existing socio-economic

environment. The process of technology transfer, thus, must be seen within a larger framework, which takes into account also the historical and socio-economic context because technology is applied in a productive system, in which hardware interact with knowledge or methods of operating it, the software part of the system. Furthermore, a social structure and organization appropriate to the level and characteristics of the technology used are also considered. Without any of these three components, imported technology cannot be efficiently absorbed, diffused and assimilated in the system.

Nepal is no exception to the common characteristics of developing countries, where more attention is given to the hardware part than to the conditions required to ensure the efficient use of the technology. Insufficient attention to creating a favourable environment for technology transfer package as a whole often leads to failure of even the best transfer deals.

The technology recipients in many instances lack information about different technologies available and have then been restricted in identifying available options. The SME entrepreneurs are not in a position to pay for technology assessment and they also lack knowledge about the trend of technological change. Even if they afford to do so, there is a lack of appropriate mechanism as well as human resources required for this purpose. It is therefore, necessary for the Government to have an appropriate system in place to provide technology assessment and match making services to the industries/entrepreneurs.

2. Lack of technological infrastructure

Technology developed in foreign industrialized countries is, in general, created at a higher level of development, with different economies of scale, and often with different technological requirements. It thus becomes necessary for a recipient country to adapt the imported technology to avoid the negative effects on employment, cultural patterns and habits, and effects leading to increasing dependence on imported raw materials and spare parts.

In Nepal's context, there is a need for appropriate mechanism for technology adaptation, reproduction/modification, innovation and absorption which, in the long run, help to build the nation's own technological capability.

Technology development and transfer mechanisms are needed for continuous innovation at the firm level. But SMEs do not have technology creation mechanisms due to limited resources, therefore, it is necessary on the part of the Government to build necessary technology infrastructure.

It is also necessary for the recipient country to create a favourable climate to facilitate an effective incorporation of the imported technology into the socio-economic environment of the country.

Thus, the ultimate purpose of a government's technology transfer policy must be to enhance the indigenous technological capability in the long run. Once a suitable technology has been imported, a process of adaptation of this technology should take place in order to absorb it efficiently. **This calls for R&D in the country level and/or industry level. Adaptation of imported technology and innovation of new technology is not happening in Nepalese industrial sector due to lack of R&D facilities. There is**

a need for doing something concrete in this area by supporting and developing the existing science and technology related organizations.

3. Lack of technical manpower

Studies conducted in the past reveal that lack of adequately trained manpower for operation and maintenance of imported machinery is a serious problem in several industries. Lack of clear provision for training of technical people of the industries from technology suppliers is one of the causes for inadequate expertise to handle and maintain the technology transferred to Nepal. This has led to dependency on foreign experts even to run and maintain the machinery, which is not affordable for most SMEs. **One of the appropriate measures for resolving this problem is to ensure that training programmes are included in the technical contracts, with training of skilled workers and technicians.**

4. Unavailability of spare parts

Often production operations are jeopardized because of delay in procuring spare parts of machinery imported from foreign countries. Moreover, rapid obsolescence of the imported machinery further makes it increasingly difficult to obtain spare parts. One of the best ways to resolve such problems is to develop our own technological capability to absorb and adapt the imported technology rather than to look for short-term solutions.

5. Policies and plans

The Foreign Investment and Technology Transfer Act 1992 has, to some extent, been able to attract foreign investor in the industrial sector. To attract them a number facilities have been provisioned in the Act. In fact the Act seems to promote foreign investment rather than technology transfer. Except for the definition, the Act does not spell out about technology transfer process and facilities which could be instrumental in transferring and developing technology in the country. So Nepal has lacked an Act that addresses the needs of technology transfer and development issues.

The information technology policy has been formulated to create conducive environment in making information technology accessible to the general public and increase employment through this means. It also emphasizes on building a knowledge-based society and establishing knowledge-based industries. The policy has already been made effective. However, effective implementation of the Act is a must.

6. Financial

Technology transfer and development is an area where lot of investment is needed because it requires adequate infrastructure and long duration to develop and test the technology. It is contextual to look at the investment made by the Government in R&D activities in the field of science and technology. The following table shows that the importance of investment in R&D is virtually not realized by the Government despite all positive policy formulation.

**Table III.6. Budget allocation by the Government on R and D
in science and technology**

<i>Year</i>	<i>GNP (In millions of Rs.)</i>	<i>R and D (In millions of Rs.)</i>	<i>Percentage of GNP</i>
1995/96	254 349	686	0.270
1996/97	204 899	655	0.327
1997/98	214 939	703	0.327
1998/99	225 894	752	0.333
1999/00	236 771	801	0.338
2000/01	247 573	851	0.347
2001/02	258 306	901	0.349

Projected

Source: RONAST, *R&D Investment in Nepal*, 1998, unpublished.

D. Challenges

- (a) Given the externalities and market failures involved, the state support will be required for S&T learning. Can the State in LDCs, therefore, take an active role in promoting science and technology learning?
- (b) The aid-dependence development is unlikely to help in technology promotion. Can LDCs, therefore, get out of the vicious circle of aid dependence?
- (c) Given the weak S&T capability and the absence of any serious network for developing it, there is not much prospect of technology leap-frogging in low-income developing countries.
- (d) A major challenge facing these countries is how to turn the system into what may be called a “supportive state” i.e. of the type that we witness in the industrialized countries.

E. Conclusion

By focusing on transfer of technology we do not want to give an impression that it is the only issue that matters. There are obviously other internal and external factors, which no doubt, have contributed towards the slow growth or even the decline of many LDCs.

However, SMEs play an important role in nation building in LDCs. By emphasizing technology transfer, we hope to draw attention to an issue, which we believe, is of serious importance, and also an issue which appears to have been ignored by the policy-makers of LDCs.

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IV. TECHNOLOGY TRANSFER: CAPACITY-BUILDING AND THE PRIVATE SECTOR OF NEPAL

*Hemant Dabadi**

A. Technology and technology transfer

The importance of technology in the modern day economy can hardly be exaggerated. It is the technological ability that makes the firms and companies competitive. The technology level of firms and companies determines their successes/failures in the world market. In this age of globalization only those firms and companies, which are using the cutting edge technology, can think of their global success that has made the Swiss good in chocolate making, the French in wine making or the Japanese in electronic gadgets making. It is the ability of the Chinese to absorb and adopt the technology that is making them the manufacturers of the world.

Technology, in the broader sense, makes us able to change raw materials into finished products required by the market and supply it to the market. The efficiency of the technology directly tells on the health of the firm/company. Technology is a tool as well as the know-how to use that tool. In other words, technology has two parts: the hardware part – machinery, equipments; and the software part – skill and knowledge to use the hardware. Some of the software parts may be documents embodied, such as manuals, processes but much of them seems to be with the capacity of the humans to put to use the machines and equipments and translate the document embodied knowledge into actual performance. Technology is not merely the ability to use but to understand the process and improve on it whenever necessary.

Technology has made a huge and qualitative jump in the second half of the twentieth century. In the traditional industries, the hardware part of the technology was and still is very important. Technology was used to move with the machines and equipments (for example, weaving machine or steel furnace). The owners or the management provided the technology and trained the workers to use it. The workers had limited options. They could either work in those machines or had to go without work that was without income. In modern enterprises, technology seems to be moving with the workforce (for example computer programming or the service industry). Of course machines are still important. But the critical issue is the knowledge and skills of the workforce to use those equipments intelligently and innovatively. Modern day machines seem to be multi functional. You can put a robot to assemble a car or weave textiles or wash the dishes at a restaurant. Besides the critical parts of different machines (the codes that make these machine perform) are converging (for example, almost every machine nowadays has electronic chip).

This development of recent decades has provided a great deal of opportunity for countries such as ours. Now it is possible for us to jump into the digital edge without going through the cycle of industrial revolution.

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In countries such as ours, whenever we talk of technology, we seem to be obsessed with the hardware part of it, that is in obtaining the machines and tools. The maximum we may go is to obtain the documentation on the processes. But rarely do we pay attention to the non-material or software part of the technology, which is the ability to make best of the available technology and improve on it.

By technology transfer, we understand the process by which our firms and companies become capable to understand, introduce, adopt and master the knowledge of certain processes. These processes may be concerned with the production of goods and services or the marketing of them, or the management of operations. The use of the word “transfer” may not be very appropriate in describing the process. Whenever we say “transfer”, we generally presume that there are two parties. One is a giver or donor and the other is a taker or recipient. In the donor-recipient sort of relationship, the recipient is passive and contributes very little to the process. But for successful mastering the recipient has to be much more active than the donor.

This is true of any recipient organizations, be it business firms, government agencies or non-governmental organizations (NGOs). The “recipients” can play active role only when they have the capacity to choose, absorb, use and improve the technology they acquire. So capacity building of the “recipients” is very important for successful “technology transfer”.

Traditionally technology transfer is viewed as movement of machinery and know-how from rich developed countries to poorer developing nations. The rich western countries have the highly educated person power and technically advanced firms which have the capacity to make the technology, both hardware and software. They have been involved in exporting such technology. The challenge for the developing countries such as ours is not only to make the best use of the technology coming to our country but also to ensure the reverse flow.

No nation or firm has the monopoly over the creativity of a person. It is the creativity of individuals working separately or in groups that creates the technology. In many cases we may have the knowledge, but we are not able to make a marketable product out of our knowledge base. It is only when we can change knowledge into products, we can say of having mastered the technology and got out from the “dependency” state of mind.

“Technology transfer” should not confine to technical production aspects alone. Marketing, management system, consumer servicing, process of running business should all be covered by “technology transfer”.

B. Technology transfer in Nepalese enterprises

The state of industrial development in Nepal is very low. Most of our enterprises are very small and often use archaic technology. One figure available for the year 2000 shows that small and cottage industries together account for 97 per cent of total industrial establishments and 85 per cent of employment generation by the industrial sector. Even in the so-called bigger enterprises, there is hardly any technological innovation going on. The emphasis seems to be to import machinery and tools, get them installed from suppliers and turn out the output until the equipments get totally dysfunctional and break down.

When the equipments break down, the first thing we think is to replace them with the similar machines. We generally tend to approach the previous suppliers without sufficiently analysing the technology options available in the market. So the technology upgradation among existing units has not happened to the desirable level.

In case of enterprises with new line products, there seems to be a little better exercise in analysing the available technological options. But in Nepal even the new enterprises seem to be involved in “old” products using mature technology. The readily available workforce to operate the “critical” part of the mature technology from across the border has also discouraged the technology upgradation, especially of Nepalese workforce in many Nepalese enterprises.

The access to technology is a major determinant of efficiency. The investment efficiency to a great extent depends on the capability of the firms to acquire new technologies and adopt them to local conditions (often called “learning” mechanisms). The Federation of Nepalese Chambers of Commerce and Industry (FNCCI)/World Bank survey has made the conclusion that the learning mechanisms are weak in Nepal. To quote the report “In house firm training is very limited..., buyers and suppliers are not coming to Nepal ..., there are few foreign investors or experienced local firms to serve as role models for ‘benchmarking’ the competitiveness of firms operations. Good public or private training sources external to firms are also limited, and government technical support services are either nonexistent or under financed or poorly managed. NGO business association, and donor programmes to assist enterprise learning are also limited, although, where they exist they are making a positive contribution”.

This does not mean there has not been any technology improvement or there is no demand for technology improvement in the country. The FNCCI/World Bank survey of manufacturing establishments carried out in 2000 revealed that 77 per cent of Nepalese firms wanted assistance in finding new technologies. The demand for technology services was second only to the demand of information on foreign markets among the business services sought out by the Nepalese manufacturing establishments. There seems to be an acute dearth of supply of such services to the enterprises. The same survey revealed that less than a quarter of the business firms could get business support services, including technology services, from business support service providers (government, business organizations or NGOs).

There may be not be available statistical information on the actual technology improvement and upgradation in the Nepalese enterprises, but the observation over the last few decades reveals that there has been a slow transformation to a higher technology level. Of course it is beyond our capacity to tell which portion of the change was due to the change in the overall business environment and which portion was due to conscious effort for technological upgradation.

Even in the sectors, which have been there for decades such as the garment manufacturing, more and more units are using more advanced machines from Japan and the Republic of Korea in place of cheaper ones from India. The old practice of individuals completing the entire stitching process on a piece rate basis is giving way to conveyor line system. Although the piece rate system of wage (considered to be the biggest hurdle in introducing the line system) is still prevailing but the individual piece rate is giving way to group piece rate where the group within itself introduces the line system.

We can see technological changes taking place in other fields too. More spectacular changes are taking place in the managerial technology. More and more well-educated and trained offspring of first generation entrepreneurs are coming to the helm of business. They are introducing new equipments as well as processes in the way they carry out business. Computer-based accounting and automated information system are being frequently used. The most spectacular improvement in the system seems to be taking place in the services sector such as hotels, banks and financial institutions. The entry of foreign and joint venture operators to the field has also accelerated the technological upgradation process.

The transfer of proprietary technology (patents, trademark, brand name) is governed by the Foreign Investment and Technology Transfer Act 1992. The Act covers the transfer of technology under an agreement with a foreign partner covering: (a) the use of any technological right, specialization, formula, process, patent or technical know-how of foreign origin; (2) the use of any trademark of foreign ownership; and (3) acquiring any foreign technical, consultancy, management and marketing service. The Act covers a very wide range of technology. The Act clearly stipulates that the permission has to be obtained from the Department of Industry, Ministry of Industry, Commerce and Supplies for technology transfer.

Going through the list of foreign investment projects in the country, one finds that the overwhelming part of them is limited to financial involvement alone. Out of 340 operating industries under foreign investment, 168 industries stated that they had other than financial arrangement in their involvement with foreign partners. There were 41 industries, which had only non-financial arrangement (technology, marketing, trademark, management) with their foreign partners. There were only 26 units, which declared that they were using trademarks owned by their foreign partners. This shows that little technology transfer, especially of proprietary technology, is taking place through foreign investment in this country. This also shows that technology transfer does not automatically take place with foreign investment.

The cursory glance at the list of foreign investment also reveals that more than half of the foreign investors investing in Nepal are individuals (172 out of 340 operating units with foreign involvement) rather than firms and companies. In more advanced countries, technology, especially the proprietary technology, will be with the firms rather than with individuals. Involvement of bigger firms and companies as foreign partners is essential for successful technology transfer to local units.

C. Problems in technology transfer

Technology transfer in a country such as Nepal is hindered by a couple of factors.

On the one side the potential technology providers or those who can supply technology are indifferent to our needs. They often do not see economic advantage of giving Nepalese firms the newest technology. Such situation is not unique to Nepal. Most of the developing country firms and even some developed country firms face similar situation and complain of resistance on the part of technology suppliers to provide new technology. It is not that they do not want to provide any technology. If possible, they would like to protect the most critical part of it and make the technology user or recipient permanently depend on the supplier. Many firms do not divulge the information of their

products to anyone. For example, Coca Cola would give the process of making the concentrate of their drink to no one in the world. It is their philosophy. It is natural for any person of this world to try to have a situation where others will depend on you and you have a secure market for the years to come.

On the other side, we ourselves, our firms and companies are not “ready” for “technology transfer”. Rather than seeking technology actively, we rely on the suppliers to give it to us. We do not invest in technology capacity building. We do not have faith on our workforce, our researchers and our institutions. We do not think that investment in modernization of our operations worth taking. So, more than the “sinister” desire of the developed countries to keep people of developing countries dependent on them, technology transfer is constrained by our own capacity to take, use and develop on the knowledge.

Let us consider the barriers faced by the “recipients” in “technology transfer”.

1. Market access

There is a perception among business firms and companies of Nepal that they do not have the resources to pay for the most up-to-date technology. They do not possess the ability to investigate, find out and assess the technology they are going to use. They have to rely on their past experience or the information provided by their friends and relatives. So they end-up approaching the old suppliers for technology. The recipients do not have a full grasp of intellectual property rights issues. They often rely on what is being told by the providers and are ready to be dependent on the technology providers.

The smaller firms and small and medium enterprises (SMEs) are even afraid of approaching huge multinational corporations (MNCs) which own the technology. MNCs on their part are reluctant to deal with “tiny” units from the least developed countries (LDCs). They do not see advantage for them in providing technology to SMEs. They are also afraid of “misuse” in case the concerned technology is of proprietary nature. It has been our experience that MNCs always view the intellectual property right-related laws of Nepal very weak and often non-enforceable. So they do not want to give proprietary technology to our firms. There seems to be a need of raising our goodwill and credibility in this field.

2. Finance

As already discussed, most of our companies and firms are small. They lack the proper financial resources. A good technology may cost you more initially but it will work efficiently for a much longer time. The firms and companies that are trying to minimize the initial capital investment, end-up acquiring old outdated and inefficient technologies. They are forced to look at short-term profit, rather than long-term returns. So they end up obtaining obsolete tools and equipments, which makes their operation unviable in the longer run. For example, if we go through the enterprises in Nepal, we find most of the power generators kept by our establishments are made in India, consuming higher amount of fuel per KWh of power generated and much noisier and polluting. Such examples could be cited on and on. The fact of the matter is, by trying to economize on the initial investment cost, we end up paying much higher operational costs later.

There are no financing mechanisms for technology upgradation readily available to our SMEs. Even when such funds are available, SMEs cannot access those funds as it is beyond their capacity to do the necessary documentation. Even when some funds are made available by donors, they are very short term and depend on continued donor contribution. But experience tells us that donors do pull out after some time and SMEs are left high and dry.

3. Human resources

The biggest hindrance to the successful technological development of our enterprises is the quality of manpower. Our enterprises seem to have inappropriate personnel. Their educational level is low, they join the enterprises without any technical training, and whatever they learn is from the workers who have already been working there. So hardly any improvement takes place in their quality, and their absorption and analytical capacity. The firms and companies also do not like to spend resources on training. The FNCCI/World Bank survey revealed that 84 per cent of the firms and companies in the manufacturing sector made little or no investment in training. The average firms trained only 11 per cent of their workforce, which is about one third of the level found in more advanced economies of Western Europe and East Asia.

The training, whenever available, also varies with the size and sectors. The survey also revealed that the larger firms were more likely to provide training than the smaller firms. The sectors which required higher technology skills (e.g. pharmaceuticals) were likely to invest more in training than the sectors such as carpets and wood. Those who provided training to their workforce were likely to be bigger firms. Seventy-three per cent of the firms, which did not invest much in training, felt that there was no need for training in their enterprises. The most frequent reasons given were the use of mature technology, readily available workers to man the operations, etc.

The fear of turnover of trained workers also acted as a barrier in training. Many Nepalese enterprises feel that once they train their workers well, their competitors are likely to attract the workers by offering a little higher emolument. So the benefit of the training investment made by them does not accrue to them but to their competitors.

Besides the firms and companies do not carry out regular training need assessment. The workforce and the management itself do not have the capacity to do the assessment. Besides the outside agencies or firms, which can successfully do the assessment, are not available. The quality of human resource and technology consultancy is very poor. Available consultants suffer from significant credibility problems.

The low educational level of the persons entering the workforce makes it very difficult to train and upgrade them. They lack the necessary analytical skills to absorb and master the technology. Even when they have the educational level, the environment does not require them to continuously upgrade their skills.

4. Policy

The prevailing policy environment of LDCs also acts as a deterring factor in technology upgradation. In Nepal we genuinely lack the policy framework which encourages the capacity building of our SMEs in the technological field. It is not the policy but more the mindset of the government functionaries that hinders technology upgradation. For example, the speedy depreciation allowed for quicker technology change is seen as an attempt to hide profit and avoid income tax and is discouraged. Frequently, training and business observation visit abroad is not allowed to be treated as genuine business expenditure. The tax-related laws and procedures seem to discourage rather than encourage research and development (R&D) among the enterprises. The budget support for technology upgradation is next to nil.

5. Research and development infrastructure and technology services

The lack of technological service infrastructure is a serious barrier in successful technology transfer. In developed countries, institutions providing expert services to firms and companies and dealing on issues of concern are more readily available. They do not only help in assessing the technological options available but also do the trouble shooting when necessary. In the case of our SMEs, nobody will be able to create R&D infrastructure on their own. But outside infrastructure is also not available.

In our part of the world, the academic institutions too do tend to suffer from a lack of resources. When the resource is in short supply, the first thing that comes under the budgetary axe is research. Even the meagre resources they get, they spend in “fundamental” research, which have very little connection with the actual world and spread it across a wide range of areas. We often find the so-called researchers working on projects without knowing what they are actually looking for.

The connection between the researchers and SMEs seem to be totally lacking. The researchers view themselves as educated and knowledgeable persons and seem to have very low opinion about small entrepreneurs and managers (less educated and knowledgeable). SMEs also think that the researchers do not and cannot help them in their problems (out of reality). They rarely approach the academic institutions for solving technological problems.

The issue is not only money. It is the way of how you spend your resources. There is no doubt that we need to increase our expenses on R&D. But even the amount of money we are spending on R&D could be used more effectively.

In the absence of network of academic institutions with the real enterprises, the knowledge existing with the academic institutions does not translate into profitable technology. So a strong cooperation between players in the economic and academic fields is required.

D. Role of business organizations in technology transfer

Do the business organizations such as FNCCI, sectoral associations, local chambers have a role to play in technology transfer? SMEs themselves are the technology recipients – they have a role to play. The Government makes the policy and can make funds available for technology transfer. The financial institutions can finance technology transfer. The academic circle can do the research and help adapt the technology to local conditions. What can the business organizations do? This is a question worth pondering.

Business organizations, as the name itself suggest, are service providers. Neither do they have technology to provide to SMEs, nor are they themselves the recipients of the technology. They rather fill in the role of intermediaries.

One of the main areas of functions of business membership organizations (BMOs) is the advocacy for appropriate policy. They can lobby with the Government for policy reforms, which will encourage technology upgradation of SMEs. The lobbying should go beyond simple policy/rules. They can also lobby for creating funds to finance technology transfer. The necessary financing is critical for technology transfer.

The chambers have been providing information services. By doing a little value addition to the traditional information services of providing names and contacts of potential suppliers, they can help SMEs to do simple technology analysis and also find out the most suitable and efficient technology. The chambers can also provide advisory services to SMEs whenever these SMEs do enter into agreement with technology providers in case of transfer of proprietary technology. For this the chambers have to strengthen their own knowledge base on international business laws. They should not remain the main up-keepers of database, but be capable of doing value addition to the information in the database.

The other important role that BMOs can play is in raising the awareness of SMEs on technology. The awareness does not mean the awareness on the need for technological upgradation, but the awareness on recent developments in the technological arena.

One of the problems found on technological upgradation of SMEs is their reluctance to share information and their rent-seeking attitude. BMOs can play an important role to resolve this issue. They can help SMEs to benchmark against each other and raise the general technological level. They can also help the enterprises to share information by bringing them together and taking them to technology missions to potential suppliers together.

The chambers can also help in arranging training, especially technical training. For an individual SME, training on its own may not be feasible. But if a number of similar enterprises join, training becomes feasible. Such training also helps in information sharing. The training providers too may not be interested to work with one enterprise, but when they come as a group, even donors seem to be interested to help and finance training.

BMOs can also act as a go-between in the academic circle and business community. They can work with the academia in shaping R&D activities and bring their focus to the problems of the real economy. In many cases BMOs can also help to generate funds for technological upgradation. They can be part of the management of such funds.

They also work with institutions to make the line of credit available for technological upgradation of SMEs.

E. Conclusion and suggestions

There can be no doubt that the upgradation of our technological level of our operators is the determining factor of our competitiveness in the world market. Through mere “technology transfer” the technology seldom reaches the designed efficiency level. The ability to absorb and improve on the technology is the key for success.

For the success in “technology transfer”, the recipients, that are our SMEs, have to be active. They should have the capacity to analyse, decide on, adapt and adopt and make the necessary trouble shootings and further improve the technology they import from suppliers. So capacity building of our SMEs is the key. The State and the business service providing institutions, such as the chambers and business associations, can help the enterprises in enhancing their capacity.

Improvement in our general literacy/numeracy level can enhance the capacity of our workforce. Continuous learning within the organizations is also required. Our SMEs should try to use the most modern technology in their operations but provide the environment which encourages learning adaptation and improvement in the processes.

Technological upgradation and innovation occurs when there is general cooperation and information sharing among enterprises, especially those dealing in one particular product or sector. So the organization of businesses such as chambers and associations can and should encourage the firms and companies to share information. They should also encourage SMEs to deal with technology suppliers in a group. This will greatly enhance their bargaining capacity.

“Technology transfer” is effective when there is a partnership between “supplier and recipient”. Not only the recipient should see the benefits of acquiring the technology, the supplier should also see the benefits of supplying the technology and be prepared to engage in long-term partnership with the recipient. This is possible when both parties see “technology transfer” not a one time deal, but a base for a continued long-term relationship.

Technology, contrary to what we presume, is with the companies rather than with countries and States. The States can only create the environment which either supports or hinders technology transfer. The policies should be conducive in the “donor” country as well as recipient countries. Many developed countries seem to hinder technology transfer to the enterprises of LDCs. We have seen many examples of arbitrary ban on transfer of technology in the name of security and proliferation. It has been found that the developed countries, especially the powerful ones, do not want the most advanced technology to go beyond their own control. They can find all sorts of logic such as dual application, or the fear of it getting to the unwanted groups. So LDCs such as ours should put a strong voice in favour of technology transfer in international negotiations.

Technology, especially proprietary technology, is becoming a major issue in international trade negotiations (for example, World Trade Organization negotiation). Developed countries, in the name of protecting the rights of their creators, are putting more and more stringent clauses on Intellectual Property Right Agreements. Our countries

also need to learn to protect our knowledge and the right of our creators. We not only need to make appropriate reforms in our laws and rules but also create legal infrastructure which is in line with the internationally accepted intellectual property right norms.

The country, in order to be technologically advanced, needs to develop its own technological base. This is possible only when we have the appropriate research and infrastructure base. In the developed economies, R&D goes in the labs of big companies as well as in the research labs of academic institutions. The companies tend to work very closely with academic institutions for technological progress. It will be improper to ask our SMEs to set-up R&D structures within themselves but they can work together with academic research institutions. The academic institutions also need to devote their attention on the needs of the economy rather than to be swayed away by the trends. It is a question of how intelligently we spend our resources. In fundamental academic research, we may not be able to do anything, but in practical field, we may be able to help our enterprises significantly.

At the end of the day it is the capability of SMEs, both of management and workforce, that decides the success or failure of “technology transfer”. Our firms need to learn to continuously upgrade their capacity. The Government needs to encourage such capacity improvement. The organizations such as FNCCI and other business membership organizations can help to devise an appropriate policy as well as encourage the firms and companies to develop such capacity. They can also help in technology transfer by providing information, advocacy and consultancy services to SMEs in the field.

Annex I

PROGRAMME OF THE SEMINAR

Wednesday, 12 November 2003

0800-0830 hours	Registration
0830-0900	Inaugural Session
0900-0930	Coffee/Tea Break
0930-1100	Capacity Building for Small and Medium Enterprise (SMEs) Development through Investment Promotion and Technology Transfer: Policy Issues and Governmental Support <ul style="list-style-type: none">- Investment Promotion by Dr B.P. Dhungana, Chief, Investment and Enterprise Development Section, Trade and Investment Division, ESCAP- Technology Transfer by Dr G.M. Fedorov, Chief, ICT Policy Section, Information, Communication and Space Technology Division, ESCAP
1100-1230	Technological Innovations, Transfer Issues and Institutional Support: Public-Private Sector Cooperation for Capacity Building for SMEs <ul style="list-style-type: none">- Mr Kalyanasundaram Lakshminarayanan, Senior Expert on Technology Transfer, ESCAP/APCTT
1230-1330	Lunch
1330-1500	Exposition and Discussions on E-business Coach: Development of Techno-entrepreneur in a Competitive Setting <ul style="list-style-type: none">- Dr Vadim Kotelnikov, Officer-in-Charge, a.i., ESCAP/APCTT
1500-1515	Coffee/tea Break
1515-1715	Discussions on Exposition and Discussions on E-business Coach: Development of Techno-entrepreneur in a Competitive Setting (<i>continued</i>) <ul style="list-style-type: none">- Dr Vadim Kotelnikov

Thursday, 13 November 2003

- 0900-1200 hours Exposition and Discussions on E-business Coach: Development of Techno-entrepreneur in a Competitive Setting (*continued*)
- Dr Vadim Kotelnikov
- 1200-1300 Lunch
- 1300-1445 1. Technology Transfer, Adaptation and Assimilation for SMEs in LDCs Context: Problems and Issues in the Context of Nepal by IEDI
Commentator: Dr G. M. Fedorov, ESCAP
2. Challenges and Opportunities for Private Sector's Participation in Capacity Building for Technology Transfer in SMEs by the Federation of Chambers of Commerce and Industry
Commentator: Mr Kalyanasundaram Lakshminarayanan, APCTT
- 1445-1745 Identification of Critical Issues of Concerns to LDCs in Capacity Building in SMEs through Technology Transfer and Innovations: Specific Recommendations for Technology Transfer and Capacity Building in Nepal
Panel Discussions:
- Dr B.P. Dhungana
- Dr G.M. Fedorov
- Dr Vadim Kotelnikov
- IEDI
- FNCCI

Annex II

LIST OF PARTICIPANTS

Mr Anil Dutta, Ministry of Finance, Kathmandu

Ms Anjana Tamrakar, Director, Creative Craft, Nepal Handmade Paper Association, Kathmandu

Mr Ashok Muraka, First Vice-President, Morang Chamber, Kathmandu

Mr Baburam Pathak, Team Leader, Intermediate Technology Development Group (ITDG), Kathmandu

Mr Bhuva Prasad Tripathi, Assistant Professor, Institute of Management, Kathmandu

Mr Binaya Prasad Shrestha, Food Research Officer (II), Department of Food Technology and Quality Control, Ministry of Agriculture and Cooperatives, Kathmandu

Mr Binod Raj Shiwakoti, Lecturer, Department of Mechanical Engineering, Kathmandu University, Kathmandu

Mr Birendra Prasad Singh, Director, Nepal Handmade Paper Association, Kathmandu

Mr Bishwa Raj Karki, Manager, Industrial Enterprise Development Institute, Kathmandu

Mr Dan Bahadur Adhikary, Section Officer, Ministry of Education, Kathmandu

Mr Deepak Narasingh Shrestha, First Vice President, Lalitpur Chamber of Commerce and Industry, Lalitpur

Mr Devendra Upadhaya, Central Board Member, Federation of Nepalese Cottage and Small Industries (FNCSI), Kathmandu

Mr Dharma Maharjan, Assistant Officer, Nepal Chamber of Commerce, Kathmandu

Mr Dilip Khanal, Executive Secretary, Handicraft Association of Nepal, Kathmandu

Mr Dilli Raj Joshi, Technology Faculty, Royal Nepal Academy for Science and Technology (RONAST), Kathmandu

Ms Indira Shakya, Chief, Technology Faculty, Royal Nepal Academy for Science and Technology (RONAST), Kathmandu

Ms Mangala Devi Manandhar, Professor, Central Department of Chemistry, Tribhuvan University, Kathmandu

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Mr Gokul Prasad Dhital, Under Secretary, Ministry of Industry, Commerce and Supplies, Kathmandu

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Mr Kishor Pradhan, President, Morang Chamber, Kathmandu

Mr Mahendra Bahadur Chitrakar, President, Brick Association, Kathmandu

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Mr Minarwa Bista, President, Floriculture Association of Nepal, Kathmandu

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Mr Neeraj Nepali, Executive Director, Lotus Intellect, Kathmandu

Mr Pradeep Maharjan, Treasurer, Nepal Dairy Association, Kathmandu

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Mr Pradip Maharjan, Senior Marketing Officer, Herbs Production and Processing, Kathmandu

Mr Prakash Oli, Technical Officer, Agro Enterprise Center, Kathmandu

Mr Rajeshwor Karki, Director, Kastamandap, Nepal Handmade Paper Association, Kathmandu

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Ms Renu Sthapit, Chief, Training Committee, Women Entrepreneurs Association of Nepal, Kathmandu

Mr Rishi Shah, Director, Lotus Holding, Kathmandu

Mr Sanjeev Gangol, Bhaktapur Chamber, c/o Industrial Enterprise Development Institute, Kathmandu

Mr Santosh Dhakal, Executive Member, Brick Association, Kathmandu

Mr Shiva Sharan Shrestha, Assistant Professor, Public Youth Campus, Kathmandu

Mr Shree Ranjan Wasti, Manager, Industrial Enterprise Development Institute, Kathmandu

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Mr Tara Nath Dhakal, Manager, Industrial Enterprise Development Institute, Kathmandu

Mr Thaneswor Pokharel, Chief, Outreach Search Division, Nepal Agricultural Research Council, Kathmandu

Mr D. Choudhury, Assistant Programme Officer, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu

Mr Rohit M. Maskey, Chief, Research Planning Division, Industrial District Management Ltd., Kathmandu

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