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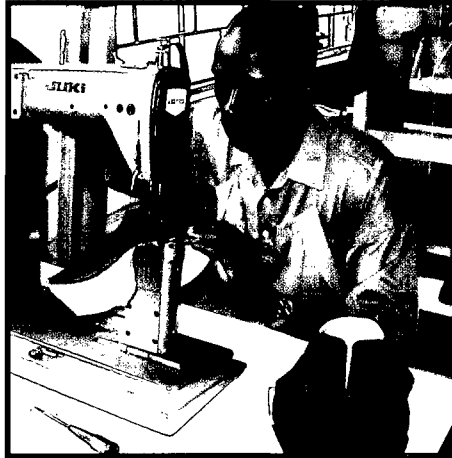
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BUILDING PRODUCTIVE CAPACITY FOR POVERTY ALLEVIATION IN LEAST DEVELOPED COUNTRIES (LDC'S)



The Role of Industry



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
economy environment employment

**BUILDING PRODUCTIVE CAPACITY
FOR POVERTY ALLEVIATION IN
LEAST DEVELOPED COUNTRIES (LDC'S)**

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2001

Preface

This study has been prepared in connexion with the Third United Nations Conference on the Least Developed Countries, to be held in May 2001. It focuses on capacity building for enhancing the contribution of industry to poverty alleviation in the context of the Draft Programme of Action for the Least Developed Countries for the Decade 2001-2010.

The study is structured as follows. Following the Executive Summary, Chapter 1 analyses the role of industrial growth in poverty alleviation, with emphasis on the role of industry as a driver of economic development, especially through productivity growth and linkages with agriculture. While the pattern of economic development and manufacturing trends in LDCs are surveyed in Chapter 2, an overview of major industries in LDC with development potential is provided in Chapter 3 focusing on agro-industries, textiles and clothing, footwear, agricultural machinery and information and communication technologies (ICTs). Finally, key policies, strategies, programmes and measures for industrial capacity building are examined in Chapter 4.

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Explanatory notes

The following terms and symbols have been used throughout the Report:
References to dollar (\$) are to United States dollars, unless otherwise stated.
Two dots (..) indicate that data are not available or are not separately reported.
A dash (-) indicates that the amount is nil or negligible.

Industry categories referred to in this publication are based on revision 2 of the International Standard Industrial Classification of All Economic Activities (ISIC).

The following abbreviations and acronyms appear in this publication:

ADLI	agriculture demand-led industrialization
AFTA	American Free Trade Agreement
APEC	Asia and Pacific Economic Cooperation
ASEAN	Association of South-East Asian Nations
ATC	Agreement on Textiles and Clothing
CAD	computer-aided design
CAM	computer-aided manufacturing
ESALIA	Eastern and Southern African Leather Industries Association
EST	environmentally-sound technologies
EU	European Union
FDI	foreign direct investment
GDI	gross domestic investment
GDP	gross domestic product
GEF	Global Environment Facility
ICTs	information and communication technologies
ISIC	International Standard Industrial Classification of All Economic Activities
IT	information technology
JIT	just-in-time
LDCs	least developed countries
MFA	Multi-Fibre Arrangement
MVA	manufacturing value added
NGOs	non-governmental organizations
ODA	official development assistance
OECD	Organisation for Economic Cooperation and Development
OEM	original equipment manufacturing
OPT	outward processing traffic
R&D	research and development
RED	rural entrepreneurship development
SAARC	South Asian Associations for Regional Cooperation
SMEs	small and medium enterprises
TNCs	transnational corporations
UNCTAD	United Nations Conference on Trade and Development

Executive summary

Introduction

This study has been prepared in connexion with the Third United Nations Conference on the Least Developed Countries (LDC III), to be held in May 2001. The main focus of the paper is on building productive capacity in line with the draft Programme of Action for the Least Developed Countries for the Decade 2001-2010. The study seeks to identify the potential contribution of industry to poverty alleviation in the light of the performance and structure of the LDC manufacturing sector. It analyses the scope for enhancing exports and domestic demand-oriented production in key industries – food manufacturing, textiles and apparel, footwear, agricultural machinery and industries utilizing information and communication technologies. The prospects for establishing effective linkages to the global industrial economy leading to continuous and sustainable upgrading in technological and skill capabilities in LDCs are analysed focusing on the integration of LDCs in global value chains. The study, then, evaluates policies and strategies that can lead to industrial growth and poverty alleviation in LDCs.

Marginalization of LDCs

Global advances in economic development and overall progress of developing countries have largely bypassed LDCs, which are struggling to overcome abject poverty but lack productive capacities to move out of the poverty trap of low income, low investment and low growth. With 10.4 per cent of the world's population, the 49 LDCs account for only 0.4 per cent of global manufacturing value added. With a few exceptions, there has been little or no progress over recent decades and many LDCs have been faced with industrial decline.

Spreading the benefits of globalisation

The economic stagnation and decline in many LDCs is linked to the insufficient attention paid to the potential development contribution of industry and, in particular, manufacturing. Without enhancing the role of industry, a sustainable path of economic development will not be achieved. It is industry – more than any other productive sector – that drives the economic growth process, provides a breeding ground for entrepreneurship, fosters technological dynamism and associated productivity growth, creates skilled jobs and, through inter-sectoral linkages, establishes the foundation for both agriculture and services to expand. Furthermore, prices of manufactured exports are both less volatile and less susceptible to long-term deterioration than those of primary goods, thus, providing the potential for sustainable export growth and integration into the global industrial economy.

LDCs will be able to benefit from liberalized trade flows and become integrated into the global industrial economy only if existing supply-side constraints for industrial growth are removed and competitive productive capacities are developed. Macro-economic stabilization and institutional reforms are necessary and have been carried out in many LDCs. By themselves, however, they do not trigger a growth process unless followed up by building capacities for the mobilization of information, knowledge, skills and technology required to equip industry with the means to compete effectively in global markets.

Industrial growth and poverty alleviation

Building productive capacities for industrial growth is crucial for alleviating poverty. Industry is a driver of economic growth in the development process and is essential for enhancing the kind of productivity that stimulates growth throughout the economy, especially through industries linked to agriculture including food security. Productivity enhancing measures – skills, knowledge, information, technology and infrastructure – can facilitate a strengthening of domestic manufacturing capacities for upgrading technology, developing comparative cost advantages and introducing new management and organizational structures needed to ensure effective integration in the global industrial economy.

Without such integration, especially through foreign direct investment and transnational corporations, it will be difficult for LDCs to develop a dynamic and competitive industrial sector, which is so essential for achieving sustainable development. Industry is at the heart of the modern knowledge-driven economy. An LDC economy with a stagnant manufacturing sector cannot achieve sustainable development in a globalizing world, let alone alleviate poverty.

Industrial development in LDCs

GDP growth in LDCs accelerated during the 1990s, but annual average per capita growth still remained only about one per cent reflecting a significant divergence in performance within the LDC group. Fluctuations in growth rates reflect vulnerability to external shocks and dependence on primary commodity markets.

The manufacturing sector has been an important contributor to aggregate GDP growth in the relatively successful LDCs, especially in Asia. Manufactured exports have grown rapidly in these LDCs, which benefited from even faster industrial sector growth than their developing country neighbours.

However, for LDCs as a whole, the manufacturing sector's share of GDP has typically remained less than 10 per cent and their share of global MVA is below 0.4 per cent. Productivity growth within manufacturing has been low and gross margins modest. Agro-industries typically account for more than 50 per cent of national MVA in LDCs.

The manufacturing performance of Asian LDCs is clearly superior to that of African LDCs. Asian industry is more diversified and its export performance is significantly superior to other LDCs. Bangladesh, Myanmar and Nepal have made considerable progress in this respect especially in clothing and food manufacturing. Many African LDCs have faced industrial stagnation or decline.

Major Industries

Food manufacturing is the most important industry in many African LDCs. Emphasis could be placed on increased processing of coarse grain, such as maize, millet, sorghum and cassava, both as a means for enhancing food security and expanding employment. High value export-oriented processed-food products also hold significant potential. Storage and transportation facilities for food crops could be expanded to counter vulnerability to shortages. The increased substitution of imported for locally produced grain in urban centres constitutes a major drain on foreign exchange resources. Meanwhile, increased dependence on food aid has an

adverse impact on employment and weakens rural-urban linkages. Improvements in local grain milling technology and an effort to stimulate demand for coarse grain-based food products in urban areas are urgently required.

Increased fish processing is feasible in many African and Asian LDCs and can make an effective contribution to both poverty reduction and export growth. Improvements in riverine boating technology and significant increases in LDC landings of deep water fishing supplemented by assistance for technical upgrading of processing and storage facilities can contribute to foreign exchange earnings and employment.

Likewise, there is scope for rehabilitation of the sugar industry and greater utilization of its by-products, especially bagasse and molasses, in several industries ranging from energy to animal feed. Adopting small-scale milling technology in the oil-seeds branch can increase employment opportunities. There are opportunities for effective integration into the global value chain of the fruit processing industries provided adequate canning and marketing capacities are developed. Expanding food processing and exports also require a rapid expansion in the biotechnological capabilities of the LDCs.

There is an urgent need for major rehabilitation and restructuring of the agricultural tools and machinery industries. Without this, increases in agricultural productivity cannot be sustained, water resources cannot be conserved and repair and maintenance of imported machinery becomes impossible. Ensuring food security in LDCs depends crucially on the rehabilitation of the agricultural tool and machinery industry.

Some Asian LDCs - most importantly Bangladesh - have made considerable progress in the clothing industry. The phasing out of the Multi-Fiber Arrangement and the new conditions facing the global textile and clothing industry will benefit mainly China and India. Nevertheless, the global apparel value chain is buyer-driven and, hence, technology and skill diffusion is widespread. There are opportunities for many LDCs to benefit from linkages to global activities of textile manufacturers and marketers based in neighbouring countries. Equally important is the prospect for developing a domestic demand-oriented textile and clothing industry that caters to the needs of growing populations in LDCs.

Furthermore, opportunities exist for development of the footwear industry, both for domestic and the export markets and for its effective integration in the global value chain.

LDCs can also benefit from application of information and communication technologies (ICTs) in a wide range of manufacturing activities. Most important is the utilization of relatively cheap telecommunication technology to facilitate business-to-business transactions and enhance connectivity. Since LDCs cannot expect a major inflow of multinational investment for enhancing ICT applications, initiatives will have to be taken. ODA support is required for application of ICT in production and distribution processes of food crops, as well as for infrastructural investments. Without investment in the information and communication technologies industry, the competitiveness of LDCs exporters in their traditional markets of textiles, clothing, footwear, cannot be sustained.

Industrial Strategies and Governance

Poverty alleviation through productivity growth and increased factor inputs, especially labour, requires development of the skills and knowledge base as well as the physical assets of

the poor. An integrated industrial policy implies the establishment of an institutional network linking public and private decision makers and entrepreneurs and organizing a continuous dialogue and flow of information between them. UNIDO's Integrated Programmes provide a framework for the development of such an industrial strategy.

Policy co-ordination of different actors has now become essential as design of industrial policy must take account of newly established international norms, especially in the field of standards, environmental regulations and intellectual property rights. Policy could target a wide diffusion of technological learning and strengthening of technological capabilities at firm level.

The fact that LDC industrial structures will be mainly based on labour- and natural resource-intensive production technologies should not lead policy makers to the conclusion that institutional support is of secondary importance. Production technologies, distributive mechanisms, policy perspectives and market conditions are changing rapidly in food manufacturing, textiles and leather. Therefore, policy must be designed to encourage entrepreneurs to take advantage of and keep up-to-date with new technological developments.

Institutional infrastructure

Policy should focus on development of public-private consultation and partnership mechanisms, as well as fostering clusters and networking among enterprises both at national and international levels. This requires development of appropriate regulatory regimes, appraisal of existing institutional structures and firm- and branch-level diagnostic surveys for promotion of international institutional linkages.

Entrepreneurship, enterprise development and the role of SMEs

A comprehensive policy framework for small and medium enterprise sector development and rural industrial development requires emphasis on employment creation, poverty alleviation and improvement of the role of women in industrial development. SME strategy should focus on enterprise upgrading – enhancing the productive capacity of SMEs to ensure that they graduate into the formal sector. A cluster strategy is important because it provides a basis for dissemination of information and technologies from large- to small-sized firms linked to product value chains. Equally important is the provision of finance that links SMEs to major financial institutions enabling them to invest in technology upgrading.

Technology upgrading and learning

The primary responsibility for technological upgrading rests with LDC governments. They need to develop a national policy framework that promotes a culture of skills for upgrading technology progress, innovation and learning. Technological growth cannot be left exclusively to the market. Developing a system-wide national technology system is an unavoidable policy imperative for every LDC.

Every successful economy today, rich or poor, large or small, is knowledge-driven. The information and communications technology revolution is permeating a widening range of

production and distribution technologies. Even such low technology industries as food manufacturing, textiles and clothing, leather and footwear, have been profoundly affected.

LDC's need to build capabilities that allow them to attract foreign investment and achieve sustainable growth. Capability building means *learning*. This requires an effort on the part of the firms, their intermediate institutions, and governance, all interacting in the formation of industrial learning systems. It is contrasted with passive development, through "transfer" of technology, or with the idea that growth follows automatically in the wake of liberalization. In order to learn and upgrade capabilities, LDC firms have to utilize existing knowledge effectively. One way of doing so is to *link* with capable partners, either locally in a cluster or with firms beyond its immediate environment.

Finance and investment

LDCs remain strongly dependent on official development assistance flows accounting for a high share of gross domestic investment, especially those in Africa. Aid flows to LDCs have declined including resources for productive projects and industry.

At the same time, net private capital flows have declined. There is a heavy concentration of foreign direct investment in a small number of LDCs, mainly in Africa, especially linked to the mining and energy sectors.

Increasing financial resources to LDCs – through FDI, ODA, build-operate-transfer, debt cancellation and reversal of capital flight from Africa - combined with improved investment efficiency would make an important contribution to building productive capacities for industrial growth and rehabilitation. Such resources could be directed towards productive capacity building and linked to technology upgrading, learning and improving competitiveness.

Industry, trade and market access

LDCs need to take advantage of increased market opportunities in developed countries following the Cotonou Agreement and the United States-African Growth and Opportunity Act. To do so, they must develop mechanisms for complying with developed market quality standards and regulations. Improving national capacity for quality control and marketing capabilities will be extremely important in boosting LDC exports. Trade liberalization will be effective only if it is accompanied by reforms and investment that build competitive capacities and ease supply-side constraints for industrial growth.

Regional Integration

LDCs can benefit significantly from participation in regional integration schemes and international industrial cooperation. This is especially likely if such schemes include successful developing countries – especially resource-rich developing countries, such as Malaysia and Thailand. Gains from participation in regional arrangements can be of particular benefit for the ICT industry in LDCs as it is often constrained by limited usage. A larger market can stimulate demand and provide a more effective basis for pooling manpower resources and skill development. Creating an ICT physical infrastructure on a regional basis also allows for more efficient exploitation of economies of scale and scope.

Regional integration schemes can facilitate the flow of international finance to LDCs through regional stock exchanges and venture capital funds. But effective macroeconomic policy harmonization is required for this purpose.

Environmental Concerns

Environmental degradation is a serious problem in LDCs. Poverty induces rapid expansion in farming practice, which, in turn, accelerates the pace of deforestation and desertification. Urban pollution grows as a consequence of the deteriorating conditions in slums. The key initiatives required to combat environmental degradation in LDCs are: (a) growth of non-farm employment that can reduce the pressure on the land and avoid environmentally unsustainable farming practices and (b) growth of SMEs that can increase the income of the poor and, thus, lead to an improvement in living conditions.

Environmental degradation can also be reduced by introducing cleaner production technologies from external sources and through domestic innovation.

Energy development

An increase in the supply and reliability of energy, especially electricity, is important for alleviating poverty. This is particularly essential for education, health, communication and SME and rural industries. This requires increasing access to and more rational use of energy, increased financing and special measures related to hydrocarbons in LDCs.

Development of new energy sources is equally critical including new renewable energy technologies in the form of solar, wind and biomass, especially rural areas, as well as small, regionally-dispersed hydropower stations. Increasing awareness of the benefits of efficient energy technologies and practices can be promoted through awareness campaigns.

Latecomer advantage

LDCs are in a position to benefit from the advantages of being latecomers in the process of catching up with other developing countries. In this regard, they have the opportunity to learn from the experience of developing countries that have successfully developed their industrial economies, such as the second generation of newly industrializing countries, including Thailand and Malaysia and others, such as Mauritius. In this context, the LDCs could initiate a process of benchmarking through linkages, and learning and, thus, convert their perceived disadvantage into advantage in pursuing their industrial development aspirations.

Way forward

This study argues that relieving poverty in LDCs is a global concern agreed in the United Nations Millennium Declaration as a commitment to build capacities for effective participation by all in global economic prosperity. Productive capacity building and poverty alleviation are inextricably linked. Capacity building requires rapid industrialization of LDCs, since industrial

development is the main driver of productivity growth and technological upgrading. Poverty cannot be eradicated in LDCs unless they are rapidly industrialized.

Requirements for learning and technological upgrading in those industries predominate in LDCs are rising. Moreover, LDCs – like all other economies in the world – have been profoundly affected by revolutionized production and marketing systems nationally and globally. Every successful economy today – rich or poor, large or small – is information- and knowledge-driven.

This means that low-wage, low-productivity development is no longer a viable option. Capacity building and rapid technological advancement is a prerequisite both for domestic market growth and for export success. Relieving supply-side constraints for industrial growth is a prerequisite for benefiting from access to global markets. It is also a prerequisite for meeting the competitive challenge mounted by transnational corporations in LDC domestic markets.

LDCs, themselves, do not possess the financial, technological and human resources to meet the globalisation challenge. The international community needs to coordinate efforts to support LDC initiatives. Synergies must be developed between public and private, as well as national and global policies, focusing on investment in areas that are of vital importance for capacity building in LDCs: food security, agricultural productivity growth, learning, technological upgrading and foreign exchange earnings and savings. Strategies are also required to put in place policy and institutional infrastructures for facilitating rapid growth of investment in those areas. Capacity building is, thus, related to growth of investment and productive capacities, which are important for reducing the marginalization of LDCs within the global industrial economy.

The policies, strategies, institutions and other measures outlined in this Report relate to accelerating industrial development in LDCs and constitute an important contribution to the future implementation of various commitments contained in the Draft Programme of Action for the LDCs for the Decade 2001-2010. They are particularly but not exclusively relevant to Commitment 4 on building productive capacities, and Commitment 5 on the role of trade in development enabling LDCs to benefit from the process of globalisation.

1. Industrial growth and poverty alleviation

A. Introduction

Global advances in economic development and the progress achieved by developing countries as a whole have largely bypassed the least developed countries (LDCs). These countries continue to face appalling conditions of abject poverty and lack the capacity to break out of the vicious circle of low income, low investment and low growth. By and large, LDCs have not been able to gain economic and industrial momentum and trigger a sustainable growth process. With a share of world population of around 10.4 per cent the 48 LDCs account for just 0.4 per cent of world manufacturing value added (MVA), 1.6 per cent of developing country MVA and 2.2 per cent of foreign direct investment (FDI) flows to developing countries. Moreover, with a few notable exceptions there have been few positive trends over the recent decades.

This chapter provides an overview of the importance of building productive industrial capacities for reversing the marginalization of LDCs in a globalized economy. It argues that industry can play an important role in combating marginalization and alleviating poverty in LDCs by enhancing productivity that stimulates growth throughout the economy, especially through industries linked to agriculture. The achievement of such productivity growth requires capacity building in terms of skills, knowledge, information, technology and infrastructure. This will facilitate a strengthening of domestic manufacturing capacities for upgrading technology, developing comparative cost advantages and introducing new management and organization structures needed to ensure effective participation in the global industrial economy. This will also contribute to the development of a vibrant and competitive manufacturing sector that is an essential precondition for achieving sustainable development in a globalized economy.

B. Industry as a driver of economic growth

Manufacturing industry is at the heart of the modern knowledge-driven economy. An LDC economy with a stagnant manufacturing sector cannot achieve sustainable development in a globalizing economy. The view that “the knowledge-driven economy is not relevant to manufactures or else only to high-technology manufactures (is) entirely wrong. All manufactures, whether large or small and whether from a traditional or a high technology sector are and must see themselves as part of the knowledge-driven globalizing economy”.¹

In the global economy, successful firms are invariably those that are constantly upgrading production processes to keep ahead of low-cost competition – this is as true of both micro enterprises and multinationals.

Manufacturing industry is a major conduit for the transmission of technological knowledge to the rest of the economy. “In the long run technological knowledge is the main source of economic growth and improvement in the quality of life. Countries that manage their

knowledge assets effectively, perform better. Firms with more knowledge systematically outperform those with less.”² Technology advances are associated with rapid productivity growth provided appropriate institutional changes and organizational restructuring is undertaken to reap productivity gains.³ Technological diffusion, through manufacturing’s intersectoral linkages, can also stimulate employment growth across the economy. Often the main source of productivity gains is not increased research and development (R&D) expenditure and innovation, but rather a wider diffusion of technological knowledge through the purchase and assimilation of efficient machinery. The impact of such diffusion through equipment seems to be growing especially in the service sector.⁴ Technological diffusion has been found to contribute more to productivity growth than R&D expenditure.⁵ Small and medium enterprises (SMEs) are also major beneficiaries from production technology diffusion. Technological upgrading can be facilitated by increased inter-firm networking and outsourcing. Such intensification of firm networking processes is often a prerequisite for building competitive capacity, nationally.

Improvements in managerial capabilities and organizational structures are also important.⁶ Firms that build up their physical assets must upgrade employee skills and introduce organizational changes to make efficient use of newly-acquired production technologies.⁷ Building domestic human capabilities is crucially important since technological knowledge cannot be wholly embodied in technological hardware and associated instruction manuals. There is complementarity between domestic technological effort – usually involving domestic manufacture and assembly of machinery and its components – and the import of technological hardware. Effective utilization of imported technologies is, thus, partially dependent on the continuing growth of the domestic manufacturing sector – without this, the technological absorptive capacity of the importing country is unlikely to grow.

The acquisition of physical capital, thus, plays an important part in building national productive capabilities. Manufacturing industry generates a productivity effect that stimulates growth throughout the economy. Economy-wide productivity gains can be achieved by increasing input–output linkages within the manufacturing sector and increasing the opportunity for SMEs to produce an increased proportion of inputs used by large firms.

The capacity of domestic manufacturers to train their workers is the single most important determinant of their capacity to benefit from technological spillovers.⁸ There is evidence that productivity differentials are the result of higher levels of education, and the return on investment in university education has been estimated at ten times that obtained from primary education.⁹

Empirical evidence suggests that manufacturing investment, which is: (i) R&D intensive; (ii) exposed to the discipline of the market; (iii) stimulates skill development; (iv) secures scale and experience effects; and (v) employs modern, state-of-the-art equipment, provides opportunities for learning-by-doing and can enhance productivity growth.¹⁰

C. Industrial growth and poverty alleviation

Higher output and productivity growth are associated not just with rising income but with improved health standards and falling illiteracy.¹¹ Moreover, there exists a two-way relationship between growth and poverty reduction, with growth itself depending on enhanced human capacity.¹²

Industrial development contributes to alleviating poverty by raising productivity, reducing risk exposure and increasing the physical income-generating assets of the poor. Harvest failure, food shortages and rising food prices, epidemics and illnesses can be mitigated by increasing the availability of food storage facilities, fertilizers, road networks, agricultural implements, irrigation equipment and medicine. The growth of non-farm employment is an important means of income stabilization for the poor.

Job creation is, undoubtedly, central to poverty alleviation. Export-driven manufacturing industries are more labour intensive than those in the import replacement sector. Similarly, global production-sharing through cross-border subcontracting and vertical integration arrangements with large firms in industrialized or developing countries, tend to be relatively job-intensive. This is because invariably the chief motivation for such production-sharing is the low cost of LDC labour.

Minimizing labour costs is not an efficient route to employment generation. This would lead to the risk that developing countries get locked into a race to the bottom where competition is achieved on the basis of lowering wages, disregarding labour and environmental standards and avoiding taxation.¹³ This kind of strategy would at least lead to immiserising growth.¹⁴ Skill enhancement is a more effective vehicle for generating employment opportunities that stimulate productivity growth and technological upgrading throughout the economy.

The shift from low-wage to higher-value employment strategies involves the promotion of teamwork, performance based remuneration¹⁵ and training.¹⁶ Ultimately, employment generation will have a sustained positive impact on poverty, if it contributes effectively to building local competencies and capabilities. It is in this sense that moving towards a skill and technology-upgrading employment strategy is important for LDCs.

D. Linkages with agriculture

Industrial growth contributes to poverty alleviation by promoting food security. Most LDCs are included in the list of the world's food-deficient countries, and the level of food deficit is rising, justifying implementation of an agriculture demand-led industrialization (ADLI) strategy. This assumes a relatively high rural income elasticity of the demand for manufactured goods and limited gains from exporting unprocessed or semi-processed agricultural commodities. It also promotes backward and forward linkages between agriculture and manufacturing. Measures to stimulate the development of small towns in rural areas can help strengthen linkages between agriculture, small-scale industry and services.

Expansion of the food-processing industry strengthens inter-sectoral linkages and augments food security. Urbanization in African LDCs has been accompanied by a major shift in food consumption patterns so that imported rice and wheat are replacing locally-produced coarse grains. As a result, coarse grain production is demand-constrained in sub-Saharan countries where the scope for domestic production of wheat and rice is limited. Processing coarse grain into competitive food products replacing rice and wheat is necessary to increase production of these crops, enhance food security and reduce food imports. But this will necessitate substantial public and private investment to eliminate supply-side bottlenecks by reducing milling costs through technological upgrading and the provision of credit.

The revival of rural and agro-related industries can also play an important role in post-civil war or post-emergency rehabilitation. Their development, when harmonized with a coherent rural

industrialization strategy, can have a decisive impact on poverty alleviation since almost 80 per cent of the world's poor continues to live in rural areas.¹⁷

E. Globalisation challenges and opportunities

As mentioned earlier, LDCs have been marginalized by the globalisation process.¹⁸ Most industries based in LDCs are low-wage and low-skill and overwhelmingly import-intensive, as far as equipment is concerned.¹⁹ Yet, despite this marginalization, LDCs are seeking to participate in the globalisation process at a rapid pace by instituting liberal macroeconomic, trade and exchange rate regimes. Is sustainable poverty alleviation and productivity enhancing industrialization compatible with globalisation?

Globalisation – in the form of trade and investment liberalization – without enhancing domestic manufacturing capacity leads to marginalization. Development of domestic manufacturing is particularly important because globalisation fosters industrial agglomeration, especially within increasing returns industries, where scale economies are substantial. Manufacturing firms concentrate in locations with easy access to dense networks of input suppliers. The wage differential effect, which is expected to counter this agglomeration tendency, is becoming weaker over time as the share of labour costs in total costs fall in a widening range of manufacturing activities.²⁰

A strategy has been suggested that can be evolved to make globalisation “pro poor” using non-governmental organizations (NGOs), aid agencies and national governments.²¹ It calls for rapid growth of telephone facilities in rural areas by ‘leapfrogging’ to cheaper digital telecommunication systems. This allows the development of small, rural-based exchange systems and the franchising of telephony to community based “telephone shops”, that have proved to be effective in rural Bangladesh²² and telecentres that provide a wider range of information technology (IT) related services.²³

Telecentres may develop into focal points for disseminating information and knowledge to the poor. Telecentres are effective in stimulating e-commerce, linking poor producers in LDCs to major purchasers in both developed and developing countries – sculpture from Haiti and hand-woven baskets from Uganda have been sold in the United States and Canada in this manner.²⁴ Some LDC-based NGOs play an important role in enabling the poor to effectively access e-commerce technology. Transnational corporations (TNCs) also play such a role, but on a limited basis. It has been argued that the lowering of trade and investment barriers has increased the profitability of low-wage investment by TNCs in firms where such investment is more profitable than investment in the IT-intensive sector.²⁵

To participate in the global economy LDCs must develop industrial skills. The slow development of such skills could be a binding constraint on LDC industrialization.²⁶ Even countries, such as Bangladesh, that have utilized unskilled labour to enter international markets (in the clothing industry) have found that this is only an entry-level strategy. Bangladesh soon discovered that it requires sophisticated design, quality control and delivery systems as product cycles shortened in the world clothing industry. New competition in global markets of products like garments, gloves, shoes, processed fruit, etc. is driven by quality, production flexibility and networking – supply chain management and technological innovation by leading firms is changing very rapidly.

Management and organizational skill upgrading is of special importance in traditionally low-skill industries. This shows that industrial training is an important determinant of the

comparative advantage of LDCs. Moreover, importing production technology in these branches is not enough. LDC firms must master the tacit elements of the new technologies. An LDC with an efficient programme for skill and technological upgrading is better able to exploit international market opportunities than an LDC with the same factor endowment, but does not have such technological- and skill-upgrading systems.

Technological-upgrading is an essential precondition for effective participation in international trade because advanced technologies are the engine of world trade. Low-technology exports grew at a significantly lower rate than total world manufactured exports, and their share fell later from 25.3 per cent in 1980 to 21.3 per cent in 1996. LDCs account for less than 0.05 per cent of low-technology manufactured exports from developing countries.^{27 28} Accordingly, it seems clear that LDCs, with a handful of exceptions like Bangladesh, are in a weak position to use export firms as a leverage for building technical capabilities.

Export growth of low-technology products – especially food manufactures, textiles and clothing and leather products – remains seriously constrained by process protection (standards and quality specification), tariff and non-tariff barriers in the OECD countries. Once a domestic technological and skill base is in place, it may stimulate export growth because innovation and technology intensity has been identified as the dominant factor behind export growth in recent years. Textiles, leather, toys, plastic products and jewellery exports from LDCs may also enjoy some growth because of relocation of TNCs – but multinationals usually prefer to relocate to non-LDC developing countries that possess an industrial infrastructure and a critical mass of created assets.

TNCs are not only the most important agents of globalisation – accounting for a significantly rising share of trade (taking the form of intra-firm trade) and capital flows - they are also important for exports of low-technology goods – food manufactures, quality clothing and footwear. FDI flows to LDCs, during 1980 –1997, accounted for less than 0.5 per cent of global FDI flows. FDI, which is the main external private source for technological upgrading, is a relatively minor source of external financing for LDCs. In 1998, net FDI flows accounted for about 15 per cent of aggregate net external resource flows to LDCs.²⁹ FDI's contribution to enhancing LDC competitiveness has, therefore, been slight. Countries that have been most successful in deepening local capabilities have done it by combining strong policies to build local skill capabilities.

External finance dominates LDCs. Investment is overwhelmingly determined by external flows. “The issue that lies at the heart of the financing problem of the LDCs appears to be the lack of effectiveness of the external driven accumulation process”.³⁰ Raising the efficiency of investment – particularly foreign inflows – is at least as important as raising overall investment ratios.

Reducing vulnerability entails: (i) increasing external inflows significantly; (ii) increasing domestic investment; and (iii) increasing the efficiency of investment above all. That is why the reduction of external flows to commodity-producing sectors and the associated emphasis on emergency programmes can be described as nothing, but tragic. This heightens the vulnerability of LDCs to external and exogenous shocks, since contribution of such emergency assistance to productivity growth, strengthening inter- and intra-sectoral linkages and technological upgrading is minimal.

The manufacturing sector has a key role to play with respect to enhancing these capabilities and, therefore, in reducing the vulnerabilities and risks to which LDCs are exposed.

International policy must focus on the question: which key industries should investment efforts be directed, to ensure a rapid build up of economic and technological capacities in the LDCs?

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- 1 DTI 2000 p. 4.
2 OECD (1996) p. 8.
3 The introduction of the new technologies does not ensure productivity gains. Productivity growth in the OECD countries during the 1980s and 1990s was significantly lower than that during the previous two decades and employment growth was flat (OECD 1996(a) p. 54). Two important policy initiatives required to enhance the productivity impact of technology upgrading are (a) speeding up the process of acquisition of knowledge needed for making effective use of the new technologies by producers and consumers and (b) redirecting innovation effort for accelerating diffusion of technology to processes with economy-wide productivity impact and linkages.
4 Manufacturing and service inter sectoral linkages are deepening in several OECD countries (OECD 1999).
5 Sakurai et al, 1996.
6 OECD, 1998.
7 Organizational change may in some cases be a pre-requisite for acquiring new production technologies but it is usually the decision to invest in new technologies, which triggers organizational changes (Metcalf, 1995).
8 Machin (2000)
9 Bigsten et al (1998) Table 2, p.14.
10 UNIDO (1999).
11 World Bank (2000a) Chapter 3.
12 Barro (1997).
13 UNIDO (2000d) p. 103.
14 Kaplinsky (1998).
15 This, of course, increases the vulnerability of the workers to shifts in market demand.
16 Varma, 1997.
17 UNIDO (2000 a) p. 15.
18 A more detailed analysis of marginalization is provided in chapter 2.
19 A description of LDC industrial structure is presented in Chapter 2.
20 O' Brian (1999) p. 65.
21 James (2000)
22 Dumas (1999).
23 In Lesotho such telecentres usually provide a fax machine, photocopy machines, PCs with printers and modems for data communication
24 James, 2000, p. 776.
25 UNCTAD 1998. pp. 109-110.
26 Lall (1999) p. 4.
27 Lall (1998) pp. 55 – 60
28 These calculations include food manufactures, wood products, and vegetable oils (but not non metallic minerals) which Lall 2000 classifies as resource based manufacturers.
29 UNCTAD (2000b) p. 54.
30 UNCTAD (2000b) p. 43

2. Industrial Development in LDCs

This chapter provides a brief survey of the pattern of economic development and the status of industry in LDCs. It highlights the limited economic transformation that has taken place in most LDCs, except in a few, successful, mainly Asian LDCs, with strong industrial growth performance.

A. Pattern of economic growth in LDCs

Output growth in LDCs accelerated modestly during the 1990s, averaging 3.2 per cent annually (1990-98) compared with 2.5 per cent a year in the 1980s. Income *per capita* increased by a mere 0.9 per cent a year between 1990 and 1998 and, if Bangladesh is excluded, by only 0.4 per cent. In 22 of the 49 LDCs, *per capita* incomes actually declined, while in 32 growth rates were highly variable.

Terms-of-trade effects had the most decisive influence on LDC growth during the 1990s. Between 1988 and 1993, LDC terms-of-trade deteriorated 12 per cent, but in 1994-1995 there was an upturn that lasted until 1997. However, between 1997 and 1999, non-oil commodity prices fell by over 30 per cent, followed by a steep rise in oil prices which increased more than threefold between March 1999 and August 2000.

The vulnerability of LDCs to such shocks is illustrated by the close correlation between changes in the terms-of-trade and in the rate of LDC growth. Countries, such as Bangladesh and Lesotho, where manufactured exports increased substantially have largely insulated themselves from terms-of-trade shocks. Industrial growth plays a crucial role in cushioning income fluctuations, reducing vulnerability to external shocks and enhancing aggregate productivity.

Most Asian LDCs are among the group of 12 countries that have achieved *per capita* income growth of more than 2 per cent a year between the period 1990 to 1998. If war-ravaged Afghanistan and Yemen are excluded, the average GDP growth rate for Asian LDCs during the 1995-1998 period exceeded 5 per cent annually. These countries benefited from the dynamism of the East and South-East Asian region and their close ties with neighbours and with regional economic groupings, Association of South-East Asian Nations (ASEAN) and, to a lesser extent, South Asian Associations for Regional Cooperation (SAARC).

The relative success of Asian LDCs reflects higher levels of industrial performance. The share of the agricultural sector in GDP declined in seven of the nine Asian LDCs during the 1980-1998 period. Manufacturing sector growth has been typically high; 8 per cent annually during the 1990s in Bangladesh and Cambodia, 12 per cent per annum in Lao People's Democratic Republic

and 7 per cent in the Maldives. Manufactured exports have also grown robustly. In particular, export success is attributable to linkages with the dynamic developing economies of East and South-East Asia, which stimulated intra-regional trade and cross-border regional investment.

Asian LDCs grew faster too because of higher investment rates, supported by external financing, including growing foreign remittances by non-residents. In Bangladesh, these average half of export earnings and their share is also rising in Nepal.

Features common to relatively successful LDCs - those with *per capita* income growth rate above 2 per cent annually during the 1990s - include:

- relatively favourable international trading conditions;
- positive spillovers from neighbours, against a background of closer economic ties;
- diversified exports so that they were not heavily dependent on primary commodities;
- relatively rapid growth of manufactured exports - notably clothing, leather goods, processed fish products and processed minerals;
- significant inflows of foreign remittances from migrant workers; and
- significant flows of official development assistance (ODA).

Because of this, investment and import growth were maintained at relatively high levels.

For these countries and many other LDCs the coming decade is likely to offer many opportunities. There are three preconditions for these opportunities to be realized:

- The redesigning of the international investment and trading system that is taking place must continue to provide support for LDC productivity growth. Reducing international inequality and marginalization could be an explicit objective. ODA levels will need to be significantly increased and restructured to stimulate productivity growth in the LDCs. Technical assistance for capacity building in LDCs should also be increased significantly.
- The primary external stimulus for growth in LDCs is economic dynamism of neighbouring countries. Developing countries are expected to grow at an annual average rate of between 5 and 6 per cent during the next decade. Cooperation between developing countries and LDCs, especially in the form of regional institutional arrangements, is vitally important for LDCs and would also benefit developing countries as a whole.
- The key to LDC success is productivity growth, which cannot occur without industrialization. The industrial sector has historically been the main user and generator of technological skills. Technological and organizational capacity building is largely dependent on the pace and structure of industrial growth. Industrial policy ought, therefore, to be a priority concern of LDCs.

B. Manufacturing sector

In 1998, LDCs accounted for about 10.4 per cent of the world population but for only 2 per cent of global GDP. As **Table 2.1** shows, LDCs share of global and developing countries MVA was minuscule; 0.3-0.4 per cent of global MVA since 1980 and a declining share of MVA in developing countries. Indeed, during the period 1980 to 1997, the share of LDCs in developing countries' MVA

has fallen by one quarter from 2.5 per cent to 1.6 per cent and there is no indication that this trend is being reversed.

Many LDCs have undergone relative de-industrialization. Although there was a slight recovery in 1995-1996, it did not survive the Asian crisis of the late 1990s, and will take many years to recover the ground lost over the past two decades. Despite this weak performance, MVA growth in LDCs increased slightly from 2.3 per cent annually during the 1980s to 2.7 per cent between 1990 and 1998.

Year	As per cent of global MVA	As per cent of developing countries MVA
1980	0.4	2.6
1985	0.4	2.5
1990	0.3	2.1
1995	0.3	1.7
1996	0.3	1.6
1997	0.3 ^{a/}	1.6 ^{a/}
1998	0.4 ^{b/}	..

Source: UNIDO, International Yearbook of Industrial Statistics, 2000, Vienna, 2000.
^{a/} Provisional.
^{b/} Estimate.

Not only did the LDC share in developing country MVA decline, it also fell in every manufacturing branch for which data are available over the period 1985-1998. **Table 2.2** shows that the share of agro-industries (ISIC 311 to 341) in total MVA increased from 69 per cent in 1985 to 73 per cent in 1998. Tobacco, textiles, leather, footwear, and paper products increased their share significantly, but beverages declined while food manufacturing stagnated. The most dramatic growth was in clothing, the share of which more than doubled, and transport equipment. The share of capital goods remained below 10 per cent of total MVA.

Table 2.2. Structure of manufacturing value added in LDCs, 1985-1998 (Per cent)		
	1985	1998
Total manufacturing	100	100
Food manufacturing	24.2	23.3
Beverages	13.6	11.8
Tobacco	8.9	10.6
Textiles	13.1	15.0
Wearing apparel	1.8	4.8
Leather	1.2	1.7
Footwear	1.7	2.7
Wood	1.9	1.1
Furniture	1.4	0.7
Paper	1.3	2.2
Printing	1.9	1.4
Industrial chemical	3.8	3.3
Other chemicals	7.1	9.1
Petroleum	3.5	2.0
Miscellaneous petroleum	0.1	0.1
Rubber	2.0	1.0
Plastic	0.7	0.6
Pottery	0.2	0.3
Glass	2.6	0.3
Non-metal minerals	5.3	5.5
Iron and steel	2.8	2.5
Metal products	3.7	3.4
Non-electric machinery	0.9	0.3
Electrical machinery	1.5	1.3
Transport	1.6	3.3
Professional scientific equipment	0.0	0.0
Other manufacturers	1.2	1.0

Source: UNIDO database.
* At 1990 constant prices.

Table 2.3. shows that out of 42 countries for which data are available:

- During the period 1985-1997, 33 countries enjoyed positive MVA growth; MVA in Bhutan, Lesotho, Uganda and Vanuatu grew more than 10 per cent annually; Bangladesh, Benin, Burundi, Cambodia, Cape Verde, Gambia, Guinea Bissau, Lao People's Democratic Republic, Mali and Nepal experienced growth rates in excess of 5 per cent a year; in 20 countries MVA grew faster than GDP, while in 19 cases it expanded more rapidly than gross capital formation in the economy;
- Asian LDCs performed better than their African counterparts. The unweighted average annual growth rate of MVA for seven Asian LDCs was 6.7 per cent (no data is available for Afghanistan). In all Asian countries, except Yemen, MVA grew significantly faster than GDP, underlining the extent to which manufacturing has become the most dynamic sector. Since GDP growth in Asian economies was significantly higher than in other LDCs, it may be argued on an *a priori* basis that rapid manufacturing sector growth lay at the heart of this stronger performance.

Table 2.3. Annual average growth rates of MVA, 1985-1997, and share of MVA in GDP, 1985 and 1997 (Per cent)

Country	Average annual growth of MVA	Share of MVA in GDP	
		1985	1997
Afghanistan	..	..	..
Angola	..	9.7	4.1
Bangladesh	5.1	15.1	17.2
Benin	5.1	6.4	8.0
Bhutan	13.1	5.7	12.0
Burkina Faso	2.0	16.6	14.8
Burundi	5.7	11.6	8.8
Cambodia	8.7	4.1	6.3
Cape Verde	8.6	7.9	6.6
Central African Republic	5.0	11.2	9.3
Chad	-4.6	17.7	15.9
Comoros	4.9	3.5	4.3
Democratic Republic of the Congo	..	12.6	8.8
Djibouti	..	5.3	5.2
Equatorial Guinea	-0.1	2.5	1.5
Eritrea	..	..	..
Ethiopia	0.3	9.0	6.1
Gambia	7.8	6.1	5.7
Guinea	4.1	3.5	3.6
Guinea Bissau	9.2	11.9	5.9
Haiti	-8.1	16.7	7.2
Kiribati	0.3	..	..
Lao People's Democratic Republic	8.9	..	..
Lesotho	13.7	10.2	14.7
Liberia	2.2	6.6	7.2
Madagascar	2.4	12.3	11.3
Malawi	3.5	16.8	14.7
Maldives	0.8	5.3	5.5
Mali	6.0	7.9	9.4
Mauritania	-2.7	12.7	8.5
Mozambique	1.5	..	..
Myanmar	1.7	8.5	8.4
Nepal	9.3	5.9	9.3
Niger	-2.7	5.2	6.5
Rwanda	-7.9	17.5	22.9
Samoa	-1.5	..	..
São Tomé Príncipe	0.5	6.4	6.0
Sierra Leone	-4.1	3.4	5.2
Solomon Islands	4.0	3.6	3.1
Somalia	2.2	4.1	5.9
Sudan	1.5	8.7	7.7
Togo	1.7	7.5	10.2
Tuvalu	..	..	..
Uganda	14.2	5.4	9.0
United Republic of Tanzania	2.4	9.6	7.9
Vanuatu	10.4	3.2	9.0
Yemen	1.6	10.3	8.1
Zambia	-14.5	24.5	11.8
African LDCs	2.6	10.3	8.3
Asian LDCs	6.8	13.3	15.2
All LDCs	5.0	10.7	10.1
World	2.9	23.0	22.9
Africa	1.4	13.4	12.7

Source: UNIDO, International Yearbook of Industrial Statistics, 2000, Vienna, 2000.

UNIDO data on the structure of production in LDCs (Table 2.3) show that:

- The average MVA share of GDP in African LDCs was 8.3 per cent in 1997, exceeding 10 per cent in Burkina Faso, Chad, Lesotho, Madagascar, Malawi, Rwanda, Togo and Zambia.

- Between 1985 and 1997 the share of MVA in GDP fell in 19 African LDCs. In only four did the share of MVA in GDP increase significantly, Lesotho (4.5 per cent) Rwanda (5.4 per cent), Uganda (3.6 per cent) and Togo (2.7 per cent).
- The share of MVA in GDP for Asian LDCs was above 15 per cent in 1997, exceeding 10 per cent in Bangladesh (17.2 per cent) and Bhutan (12 per cent). Accordingly, the level of industrialization in Asian LDCs is higher than in African LDCs.
- In Asian LDCs, the MVA share of GDP declined significantly only in Yemen.
- In all other Asian LDCs, there has been a significant increase in the MVA/GDP ratio, which has almost doubled in Bhutan, and rising some 2 per centage points in both Bangladesh and Cambodia.
- In the Pacific Islands, manufacturing is significant only in Vanuatu where the share of MVA in GDP increased from 3.3 per cent in 1985 to 9.0 per cent in 1997.

The data show a marked difference in industrial, as well as economic, performance between the Asian and African LDCs. While MVA in Asian LDCs more than doubled during 1985–1997, the share of African MVA in total LDC MVA has been constant. Bangladesh is currently the largest LDC manufacturer with an aggregate MVA in excess of \$4 billion. In 1985, it ranked below Sudan, which remains still the largest among African LDCs, virtually doubling from \$2 billion in 1985 to almost \$4 billion in 1997. Two African LDCs, Angola and the Democratic Republic of Congo, experienced conflict-driven catastrophic declines, with MVA falling 70 per cent in Angola and decreasing by more than half in the Democratic Republic of Congo over the period.

In 1997, the majority of LDCs had minuscule manufacturing sectors with MVA exceeding \$500 million in only six – Bangladesh, Democratic Republic of Congo, Ethiopia Sudan, Yemen, and Zambia. Indeed, the combined MVA of Bangladesh, Bhutan, Maldives, Myanmar, Nepal and Yemen is well below that of Pakistan, and the combined MVA of all African and Asian LDCs is a fraction of India's (12 per cent).

A typical LDC has only a handful of large, formal-sector manufacturing enterprises. Small, informal-sector firms account for a large part of manufacturing employment, producing a very narrow range of goods. **Table 2.4** illustrates the overwhelming importance of agro-industries – excluding agro-input industries (fertilizer, chemicals and agricultural machinery). The weighted average share of agro-industries in MVA of the countries, listed in **Table 2.4**, is 70.6 per cent with eight of the 13 countries registering a higher share.

Table 2.4. Structure of MVA in selected LDCs and share of MVA by industrial categories (Per cent)

Country	Agro-based ISIC 311-341+390	Intermediate goods ISIC 342-372	Capital goods ISIC381-389
<i>Large LDCs</i> ^{a/}			
Bangladesh	65.4	24.7	7.9
Yemen	74.7	24.1	-
Ethiopia	45.2	21.0	4.1
Zambia	59.3	26.8	13.8
<i>Middle and Small LDCs</i>			
Nepal	71.7	20.2	5.6
Malawi	75.9	20.8	3.4
Madagascar	76.3	13.2	7.6
Uganda	80.4	12.6	7.0
Burundi	93.0	4.1	2.8
Central African Republic	86.8	10.6	2.6
Bhutan	45.1	54.0	0.5
Niger	60.3	28.4	11.3
United Republic of Tanzania	54.9	33.8	11.5

Source: UNIDO database.

^{a/} Latest available year in current prices.

^{b/} Defined in terms of size of aggregate MVA. Figures do not add up due to statistical discrepancy.

Food-related industries dominate industrial production in LDCs (Table 2.5). Textiles appear in seven cases and beverages in six. Significantly, leading export industries – clothing, leather, footwear and furniture – do not appear at all, with the exception of clothing in Bangladesh. The only non-agro-related industrial branches with high shares are industrial chemicals and cement.

Table 2.5. Major industrial branches by country - latest available year in current prices (Per cent)

Country	Food						Industrial chemicals	Other chemicals	Cement
	Beverages	products	Textiles	Clothing	Wood	Paper			
Bangladesh	..	12.7	23.5	10.2	..	..	12.2	..	10.3
Bhutan	12.0	..	..	..	17.3	..	..	21.2	2.8
Burundi	21.5	56.4	..	..	..	..	..	..	..
Central African Republic	12.3	24.7	..	..	19.8	..	20.5	..	..
Ethiopia	25.2	18.8	11.0	..	..	..	..	..	..
Madagascar	12.0	25.4	29.1	..	..	..	..	..	..
Malawi	..	25.8	15.8	..	..	16.2	..	..	..
Nepal	..	9.6	32.7	..	..	..	..	..	9.7
Niger	..	33.1 ^{a/}	..	..	..	25.6 ^{b/}	..	17.6	..
United Republic of Tanzania	..	12.4	15.6	..	..	..	1.0	13.9	..
Uganda	11.4	41.1	11.6	..	..	..	..	..	..

Source: UNIDO database.

^{a/} Including beverages and tobacco

^{b/} Including publishing.

Data on manufacturing productivity and gross margins are available only for a very small sample of LDCs (Table 2.6). Productivity – value-added per employee at current dollars – rose in three countries. The fall in Bangladesh was largely attributable to devaluation of the taka, which fell 21 per cent against the dollar between 1985 and 1997. Productivity, in constant 1985 taka terms, rose marginally.

Table 2.6. Aggregate trends in LDC manufacturing: productivity and gross margins ^{a/}
LDCs manufacturing, 1985–latest year ^{b/}

Country	Value added/employee (current dollars)		Value added/output (per cent)		Gross margins (per cent)	
	1985	Latest year*	1985	Latest year*	1985	Latest year
Bangladesh	1,826	1,711	34.6	32.0	70.1	60.8
Central African Republic	4,157	7,694	30.0	27.9	41.8	38.4
Malawi	3,023	3,958	27.3	39.2	64.6	78.4
Nepal	1,721	1,809	41.0	41.6	76.7	79.6
Ethiopia	...	...	48.5	47.5	77.5	81.8
Zambia	...	...	51.0	41.7	81.8	60.5
Niger	...	...	38.8	20.7	...	...
India (memo item)	...	...	18.3	19.9	49.3	66.6

Source: UNIDO database.

^{a/} Gross margins = (Value added – wages) value added.

^{b/} Latest year available: Bangladesh (1997); Central African Republic (1993); Malawi (1994); Nepal (1994); Ethiopia (1995); Zambia (1994); Niger (1996); India (1995);

High material costs limit the extent of value added in LDC manufacturing, while in five of the seven cases value added actually declined significantly. The return to capital (the ratio of value added minus wages relative to value added) is high, often exceeding 60 per cent, and has risen in four countries. Total factor productivity growth has stagnated in African LDCs.

Manufactures, dominated by textiles, account for 23 per cent of total LDC exports (Table 2.7). Textiles account for almost three quarters of LDC manufactured exports, while semi-manufactures are dominated by minerals and agro-processing industries, with cotton ginning responsible for over 20 per cent of semi-manufactured export revenue. Textile-related sectors, thus, account for some 40 per cent of the revenue earned by manufactured and semi-manufactured exports.

While it is not possible to generalise on the basis of such a limited sample, it appears that, apart from a handful of LDCs, there has been little change in the composition of manufactured exports. For most LDCs, the extent of processing remains low and prospects for growth in manufactured exports depend crucially on extending the value added chain by increased processing of domestic materials. The greatest potential lies in agro-related industries.

Table 2.7. Major manufactured exports of LDCs, 1997 – 1998

ISIC	Manufactures	Value (in millions of dollars)	As per centage of	
			LDC exports	Developing country exports
842	Men's garments	1,217.7	6.1	6.8
844	Undergarments	918.4	4.6	10.5
667	Pearls etc.	782.9	3.9	9.8
843	Women's outer garments	658.0	3.3	3.0
845	Knitted outer garments	612.7	3.0	2.7
611	Leather	212.0	1.1	3.3
655	Floor covering	208.1	1.0	6.3
<i>Semi Manufactures</i>				
333	Petroleum and products	3,910	19.6	2.2
263	Cotton	1,593	8.0	23.6
845	Crustaceans etc.	768	3.8	7.1
247	Other wood	379	1.9	10.1
043	Fish	354	1.8	4.9
287	Ores and concentrates	341	1.7	3.6
054	Vegetables	305	1.5	4.2
281	Iron and steel concentrates	284	1.2	6.2

Source: UNCTAD: The Least Developed Countries, 2000 Report, Geneva, 2000.

Given the breadth and extent of – mainly backward – linkages to agriculture and the scope for increasing agricultural output as a springboard for industrial development, agro-industry development represents the optimal medium-term growth path for LDCs, especially in light of the need to enhance food security and alleviate poverty. Since most agro-industries are labour-intensive, the need for technological upgrading is often obscured, but technological change continues to take place at a rapid rate in branches, such as textiles, clothing and food processing.

3. Major industries in LDCs

An overview of key industrial sub-sectors in LDCs is presented in this chapter.¹ These industrial sub-sectors have the potential for further development with regard to their comparative advantage and scope for alleviating poverty. They have been selected on the basis of their contribution to: (i) GDP growth; (ii) achievement of food security; (iii) employment growth and poverty alleviation; (iv) technological upgrading and skill development potential; and (v) potential export growth.²

A. Food manufacturing³

Food manufacturing (ISIC 311 – 314) is the most important sub-sector in African LDCs with its share in total MVA exceeding 80 per cent in 17 out of 37 African LDCs for which data were available in the mid to late 1990s. In most other cases the ratio was close to 50 per cent.⁴ Food manufacture typically accounts for a larger share of manufacturing employment than any other branch in most LDCs and in Asian LDCs supplying a significant share of manufactured exports as well.

The share of food manufacturing in MVA is significantly lower in Asian than in African LDCs, but backward and forward linkage effects with the rest of the economy are much stronger. UNIDO estimates that in the early 1990s the import content of food manufacturing industries was near zero in Bangladesh, indicating strong backward linkages with agriculture. There are also strong forward linkages with the packaging industry in Bangladesh and Nepal.⁵ There is some evidence that backward linkages with agriculture have increased in those African countries that experienced a maize revolution in recent years.⁶

Grain Processing

Expansion of food manufacturing capacity in LDCs, especially grain processing, could make an important contribution to food security and poverty alleviation, *inter alia*, by increasing the conservation of food products. Processing of coarse grains – maize, millet, sorghum, cassava – is relatively undeveloped and could make a far greater contribution than in the past to employment generation and the replacement of food imports. High levels of food imports – and food aid – in African LDCs reflect low levels of both farm production for sale and food-processing activity. Factor productivity in food processing is estimated by UNIDO to be lower than the average for manufacturing in African LDCs and far below average productivity in food manufacturing in African countries, as a whole.⁷

Demand constraints have stifled industrial growth because income and consumption have not grown rapidly enough to stimulate increased demand for processed grain. Indeed, even where grain production increased, there are cases where domestic *per capita* consumption has fallen.⁸

A rapid increase in grain production is feasible in some LDCs along with the adoption of mechanized processing technology to reduce costs, and increased application of new biotechnologies to boost crop production.⁹ Unfortunately, crop research in Africa has paid insufficient attention to processing and storage, while hybrids have low processing potential. Greater use of chemical fertilizers, especially in maize production, would boost yields and output.

Fish processing

Fish processing has grown rapidly, worldwide, in recent years with world production estimated at over 100 million tonnes. In Africa, however, there has been little expansion and virtually none at all in the processing of industrial catches, which are concentrated on the South Atlantic shelf. Inland riverine fishing is well developed in Chad, Uganda and United Republic of Tanzania, while Mauritania is a major supplier of cephalopods, demand for which is expected to grow.

There are good prospects for Atlantic suppliers, as catches in the North Pacific by Japan and Republic of Korea have been reduced. African LDCs, such as Mauritania and Somalia, are also important suppliers of pelagic species, the future of which, however, remains uncertain because over-fishing threatens all species, with the possible exception of anchovies, herring and sardines.

Fish exports and production have also grown rapidly in the South Asian LDCs – especially in Bangladesh – where they now account for over 10 per cent of total exports, second only to garments. The development of the boat-building industry, however, is a prerequisite for increased fish output. Fortunately, there is strong donor interest in promoting the industry, notably from the Scandinavian countries.

New processing industries (canneries, freezing facilities, etc.) could also be developed. In Mauritania, the utilization rates of freezing units were only 23 per cent in 1995 and distribution of frozen fish to markets was minimal.

There is enormous potential for increasing both riverine and industrial fishing and fish processing in several African and Asian LDCs. But expansion of industrial fishing is hampered by Euro-Africa fishing agreements. Because African and Asian LDCs have little experience of industrial fishing, they licensed commercial fleets from deep-water fishing nations to exploit their resources. These agreements included provision for technology acquisition and upgrading of the local fishing industries.

However, because of over-fishing many African industries are on the verge of collapse. At the same time, there has been a marked reduction in compensation packages offered to African countries. Because it has an established local marketing infrastructure and processing capacity geared to the export market, Senegal stands out as a beneficiary of on-shore employment and increased government revenue from local landings of fish caught by foreign-based fishing trawlers.

But in most LDCs, very little of the anticipated industrial processing has materialized, and fishing villages and ports are still impoverished. Consequently, even Mauritania has had problems setting up adequate on-shore facilities.

Some fishing companies have begun to respond to this problem by encouraging modernization of on-shore equipment and boat building (for instance, in Mauritania and Senegal) to adapt this production to the needs of small-scale fishermen.

Stricter regulation of over-fishing, limitation of poaching, expansion in landings and improvement of backward and forward linkages with the local economy are necessary if fish processing is to attract foreign investment and generate exports. Lack of refrigeration facilities and cold storage chains is an important constraint, as are packaging inadequacies and the absence of quality control.

Oilseed and sugar processing

In Sudan and Uganda oilseed production and processing have increased with over 200 oil mills operational in Sudan capable of producing 1 million tonnes annually. There is considerable scope in Ethiopia and Eritrea for expanding small-scale oil milling operations at village level, while small oil-processing machines have been introduced in Kenya, Sudan, Uganda, United Republic of Tanzania and Zambia. Successful utilization of this technology entails its rapid dissemination to farmers and provision of both training and credit facilities by suppliers and promoters of the technology.

Sugarcane production in Mozambique, Malawi and Sudan has created strong agro-industrial linkages through the use of by-products – bagasse, molasses and cane – that serve as inputs into the paper, animal feed, energy, particleboard, fertilizer and chemical industries.

New Technologies

Multinationals dominate many branches of the food-processing industry. Introduction of the new technologies – both biotechnologies and information technologies – by these firms is essential for LDC participation in global value chains. Capability-building initiatives must concentrate on utilizing the new IT-related technologies for promoting efficient storage and distribution networks, linking small-scale, regionally-dispersed producers to major firms.

Since there is little prospect of rapid development of the pharmaceutical sector in LDCs, food processing is the most likely beneficiary of biotechnology applications. Of particular interest to LDCs is the development of processing techniques that help to improve the transport and conservation of staple food crops, especially since this could improve food security.

But the greatest potential impact on food-manufacturing may come from agricultural research. Over 80 species of crops have been identified, mainly in the United States, that could be genetically manipulated and it is likely that in the coming years gene transfer systems is an option that

will exist for most crops.¹⁰ These new breeds typically produce higher yields, are more resistant to diseases and/or require fewer chemical inputs.

Some of these new crops, developed and cultivated mainly in the United States, could erode traditional LDC export markets. Vanilla, made from cell cultures in California, will cost a fifth of the vanilla bean extract produced in Madagascar, while coconut production and exports could decline as a result of advances in biotechnology (Box 3.1). These threats underscore the need for LDC industries to upgrade and diversify their operations through technological advance, including biotechnology, greater marketing efforts and increased investment in conventional technologies.

Box 3.1. Biotechnology advances affecting coconut production

Coconut oil is produced in many tropical countries. It contains a high proportion of lauric oil, used in the manufacture of soaps, cosmetics, shampoos and detergents, as well as in food processing. For the past 20 years, biotechnology firms in the United States have been trying to develop an alternative source of lauric oil. A variety of rapeseed, with high lauric oil content, has been developed and although this new variety requires more work and management in production and distribution than the coconut one, in the medium term these problems could be solved. Countries currently importing coconut oil may become self sufficient, damaging an important sector of many third world economies (80 per cent of Vanuatu's export earnings are derived from coconut oil).

Technologists and policy makers agree that R&D to improve coconut production has been insufficient and underfunded. Although the sector will inevitably suffer from the development of the lauric oil from rapeseed, investment in improving coconut plantations and the processing of its products can reduce much of the damage. Diversification of the industry (away from coconut oil to fresh nuts and coconut milk products) also has the potential to offset some of the adverse effects.

Source: Nichterlein, K. (1997), "Biotechnology Advances In Oil Crops Affecting Coconut Production" *BINAS News*, vol. 3, Issues 3 and 4.

In Africa, policies to reduce post-harvest losses - estimated at over 40 per cent of production in the sub-Saharan region - by developing processing- and storage-friendly crops are essential.¹¹ Research on cassava processing resulted in techniques that not only reduce the cyanide content but also minimize losses.

Given that most LDCs are small countries, regional cooperation is desirable to undertake R&D in biotechnology. Regional research institutions, including those in LDCs, together with neighbouring developing countries should be promoted. It would be important too, to develop new linkages with major multinationals that are the driving force in the field of biotechnology research. At present, these firms are focusing their research mainly on products and crops that are not of mainstream concern to LDCs but which could have adverse market implications, as in the case of coconut oil. The establishment of manufacturing facilities in LDCs is feasible¹⁰ and could become a conduit for technology transfer.

Some of Africa's traditional crops - especially cocoa and sugar - are threatened by new bioproducts being developed by multinationals, such as Nestle and Hershey. High fructose corn syrup, which is maize-based, is being developed as a sugar substitute, which could be exploited by maize producers, like Malawi, Mozambique and Zambia. This underlines the need to upgrade crop-processing technology across the board.

The private sector is becoming increasingly involved in biotechnological research, but capabilities are limited, and only Burundi, among the African LDCs, has recently undertaken a feasibility study to establish a national biotechnology centre. Development of biotechnological capabilities requires a combination of a wide range of skills and knowledge - hence institutional collaboration on a regional basis is crucial. Biotechnology is human skill-intensive, and training and information access is much more important than equipment. A critical minimum national capability to assimilate transferred biotechnology would need to be created.

Information access is of crucial importance. LDCs would need to develop the capacity to monitor developments in biotechnology in industrialized countries and assess their likely impact. Provision of off-line facilities to existing international biotechnological databases should be the starting point for connecting LDCs to the global biotechnology industry.

Technology transfer to LDCs is increasingly dependent on effective participation in global commodity chains. Enhanced efficiency depends on the participation of “chain leaders” in the organization of production and marketing of LDC firms. It is only if “chain governors”¹¹ build those capabilities and institutions that contribute to sustainable increasing returns in LDCs, that the participation of the latter in global value chains will be effective.

Scope for such effective participation varies significantly by commodity. In the fresh fruit and vegetable chain, large retailers based in developed countries place emphasis on quality, reliability of supply and standards compliance. The development of packaging industries is also crucial. Merely growing more crops is unlikely to lead to increasing returns. LDCs must develop capabilities in marketing, standardization, packaging and the development of new products. In the canned fruit industry – where the extent of processing is much greater – increasing returns require close horizontal linkages between and among fruit producers and canners.

C. Textiles and clothing

Globalisation is having a far-reaching impact on the cotton commodity chain and the clothing and textile sector in LDCs. The phase-out of the Multi Fiber Arrangement (MFA) and the Agreement on Textiles and Clothing (ATC) in 2005 will influence trade, capital flows and international specialization.

International investment in the clothing industry is driven mainly by labour cost differentials, not by market size. Modern telecommunications networks have enabled producers to adopt global production-sharing strategies that separate the labour-intensive assembly from the capital-intensive pre-assembly phases of clothing production. The location of labour-intensive processes is influenced by production and distribution efficiencies – just-in-time (JIT) production, small orders, low inventories, improved quality and short delivery times.

Increasingly, these factors are offsetting labour cost advantages giving rise to regional agglomeration in the global clothing industry.¹² Geographically proximate countries in Asia are more likely to be sources of FDI flows to LDC clothing industry than European or North American firms. This is so because mergers, vertical integration and strategic alliances are isolated trends in the textile and clothing industry and, in recent years, there have been virtually no such transactions involving LDC firms. Although preferential market access has stimulated investment in LDCs, such as Lesotho and to a lesser extent Mozambique, these trends are weakening.

Preassembly operations are dictated by technological developments, and although capital-intensity has increased, there is still considerable scope for the use of labour-intensive techniques. Computer-aided design (CAD) and cutting systems have facilitated the integration of pre-assembly operations with substantial productivity gains.

Clothing and textiles are now major sources of export revenue for most Asian LDCs and a handful of African countries. Such industries, serving both the domestic and foreign markets, are not only labour-intensive but also deepen agro-industrial linkages in cotton- and wool-producing LDCs.

Structural change is most marked in clothing, with the share of clothing in OECD textile and clothing imports rising from 53.6 per cent in 1985 to 64.5 per cent in 1992 and a projected 67 per cent by 2004. A similar trend is forecast for fabrics. Clothing exports from the developing countries to the EU grew at an average annual rate of 15 to 17 per cent during the 1990s.

Demand growth for cotton and woollen items slowed in the late 1990s and is projected to remain relatively sluggish over the next few years. In contrast, synthetic fibre capacity has grown over 15 per cent annually over the last three years, as the share of man-made fibres in total fibre consumption increases. Competition from China, Bangladesh and Eastern Europe has intensified.

Clothing will be the last sector to be integrated into the WTO system and until 2005 most clothing items will remain subject to quantitative restrictions for non-preferential and non-outward processing traffic (OPT) countries. LDCs will need to rethink their policies, promoting product and market diversification to benefit from this changing situation.

Key features of the ten-year MFA phase-out period include:

- Clothing products of significance to importers have been left on the MFA list until the last stage (2005), when large-scale liberalization will occur.
- Countries are permitted to initiate anti-dumping action against “unfairly traded” goods.
- The average post-Uruguay Round tariff on clothing and textiles will be 12 per cent compared with 16 per cent pre-Uruguay Round. Despite this reduction, the textile sector will still have the highest tariff in the goods sector.
- Despite liberalization, textiles and clothing will remain one of the most-protected sectors.

During the 1990s, in both the United States and the EU clothing markets there was a significant movement away from traditional suppliers of East Asia to new, lower-cost suppliers. Despite reduced export volumes traditional suppliers managed to maintain their value shares in a small range of products by upgrading quality. In 10 leading product exporter categories to the United States, China appeared in seven, India in five, Bangladesh in three and Sri Lanka in two. Bangladesh is the only LDC which figures in these product groups, and also the only LDC to appear in the EU’s top ten list in the late 1990s. In the T-shirt and cotton shirt categories, Bangladesh is usually the least-cost supplier to Europe. China and India are often identified as major gainers from the MFA phase-out. At the same time, these two countries have emerged as major competitors of LDCs.

Increased concentration, likely to result from the phased reduction in quotas, may mean that some minor producers will leave before integration of clothing into the new system in 2005. The key to survival is not just low wages – although foreign investors cite this as the single, most important consideration. Evidence shows that major African clothing exporters (Mauritius, Morocco, Tunisia) cannot compete with Bangladesh, India, Pakistan, Viet Nam, and perhaps even China, on wage costs, and some firms have moved from relatively high- to relatively low- cost countries – for example, from Mauritius to Madagascar. Specialization and the development of market niches will be the key to maintaining, or expanding, export market shares.

Two-thirds of world textile production capacity is in developing countries and relocation to low-cost sites is continuing. The internationalisation of EU firms has taken the form of cut, make and trim (CMT) and OPT arrangements. Only firms with their own manufacturing units in the EU are awarded OPT quotas. OPT arrangements are geographically widespread – but in a typical year, three quarters of OPT imports originate from Eastern Europe and Turkey.

Subcontracting and extra-EU production by European clothing manufactures now account for over 40 per cent of total turnover as against only 28 per cent in 1983. Foreign sourcing is most common among large diversified companies operating in brand markets and among producers of children's clothes.

With clothing distribution becoming increasingly concentrated in the EU and the manufacturing sector fragmented, moving abroad to even cheaper sources will remain an attractive long-term policy. Today, the choice is not the EU or Eastern Europe, but Turkey or Morocco. Tomorrow it could be the United Republic of Tanzania or Uganda.

Some Asian countries – including a few LDCs - have emerged as major players in the United States markets, including Bangladesh, Indonesia, Macao, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka and Thailand. Bahrain, Oman, Qatar and the United Arab Emirates are also expanding their exports to the United States.

Moreover, there is evidence of a second migration of the clothing and textile industry in Asia. Hong Kong firms are shifting to China, especially to Guangdong. The usual pattern is to relocate labour-intensive processes and retain skill-intensive activities through joint ventures and the establishment of subsidiaries. In the 1980s and 1990s, large Hong Kong producers set up operations in a wide range of developing countries, mostly in Asia.

Both European and Asian firms have incentives to relocate to low-cost sites with sizeable domestic demand and proximity to the EU, which is the world's largest textile and clothing market. African LDCs have the added advantage of preferential access to the market.

Changing production technology, particularly in clothing, may benefit LDCs. One positive trend is the shift away from fully "unmanned factories", with emphasis switching to design, new fabrics production and delivery flexibility, quality and service. Computer systems are being oriented to pattern grading, marketing and materials transport. There has been a dramatic decrease in the price of entry-level systems, and new technologies are becoming affordable and more accessible to small- and medium-sized firms. While new technology has changed the organization of the overall supply chain in the clothing industry – enhancing economies of scale – it has not fundamentally affected the most labour-intensive production processes on the sewing room floor.

"Effective" integration into the global apparel commodity chain involves the creation of capabilities in LDCs to move from the mere assembly of imported inputs to a domestically-integrated and higher value-added form of exporting – known as full packages supply or original equipment manufacturing (OEM). Some developing countries are seeking to move beyond the OEM stage to original brand name manufacturing.

The move from assembly to OEM involves the establishment of close linkages with a diverse array of lead firms. Usually, retailers and marketers in developed countries rely on full package

sourcing networks supplying inputs and technology and buying ready-made apparel from developing-country firms. Often firms in East Asia act as co-coordinators for lead firms and outsource labour-intensive processes to low-wage LDCs – Bangladesh, Cambodia and Nepal. Branded manufacturers, on the other hand, avoid such networks and focus on apparel assembly in neighbouring countries – they are relatively unlikely to source in LDCs.

Contractors, based in Asian countries, contribute less to production technology transfer in LDCs, such as Bangladesh, Cambodia, Lesotho and Nepal. They mainly transfer organizational and distribution systems which build economic and social networks between buyers and sellers. This is leading to regional integration of the East Asian apparel industry, which incorporates all elements of a commodity chain, giving rise to increased competition among global manufacturers and leading further to an acceleration of knowledge transfer from more to less developed country clothing firms. Myanmar has been a recent beneficiary of such technological diffusion.¹³ As intra-Asian apparel exports increase, firms in Hong Kong, Republic of Korea and Taiwan Province are becoming branded manufacturers themselves, and their contribution to production knowledge transfers to countries, such as Myanmar, Lao People's Democratic Republic and the Democratic Republic of Korea, is likely to increase.

Future prospects:

- In African LDCs, there are few grounds for optimism over clothing and textile development, but clothing exports are growing in four countries – Chad, Ethiopia, Madagascar and United Republic of Tanzania. However, export prospects appear limited for the vast majority of African LDCs, partly because, unlike Asian firms, North African apparel manufacturers and marketers do not source regionally. On the other hand, *per capita* consumption of textile and clothing in Africa is by far the lowest in the world. There is, thus, a strong *prima-facie* case for domestic demand orientation in LDCs with large populations and raw material availability (cotton for natural fibre, chemicals and petrochemicals for synthetics). Several African LDCs fit into one or both of these categories and the development of an efficient domestic demand-oriented textile and clothing branch would be justified, as with Myanmar and Nepal. Production for the local market must be mainly in the form of low- and medium-count yarn, grey fabric and coarse cloth. Given the low levels of income in LDCs, production must be price, not quality driven.
- In many of these countries textiles and clothing represent one of the largest manufacturing branches. But it is often inefficient with low capacity-utilization levels. The focus should be on rationalization, restructuring, rehabilitation and modernization.
- In the past, there has been little African penetration of the United States market, though this may change with the introduction of the Africa Growth and Opportunity Act that gives selected African LDCs preferential entry to the United States clothing market. The presence of a large African community with strong cultural ties to the home continent provides a rare opportunity for African textile products. Asian LDCs will continue to have good export prospects provided they achieve and sustain “effective” integration in the global apparel value chain, which is driven by major international buyers.

D. Footwear

Developing countries have, since the 1970s, made major-advances in the footwear industry (both leather and plastic) and have also significantly increased their penetration of international markets. Progress in other segments of the leather industry is more limited.

Footwear technology is relatively straightforward and suited to low-labour-cost countries. Between 1978 and 1999, the industry was physically relocated in developing countries with the share of developed market economies in global footwear manufacture falling from 24 per cent to 14 per cent, while that of developing countries increased from 53 to 73 per cent. The main beneficiary was Asia whose share of world shoe manufacture increased to over 60 per cent from 40 per cent. Production in Europe shifted from north to south, and in East Asia, from the Republic of Korea and Taiwan Province to China, Indonesia, Thailand and Viet Nam, with Malaysia and the Philippines also becoming significant producers.

Some developed-country producers (Germany and the Scandinavian countries) have larger investments outside their countries than at home. Productivity levels are higher in developed countries but the cheap and abundant supply of labour in developing countries more than compensates for this. Eventually, cheap footwear production will shift to countries offering a package based on the lowest labour costs, but also able to meet certain other basic criteria, such as reliability and ability to meet delivery dates, political stability and a basic infrastructure for technological upgrading.

Foreign investment in the African and Asian LDC footwear industry is limited, but shoe production and exports have been growing in African countries, and as income levels rise so too will domestic demand. Given a raw material endowment suited to leather and footwear manufacture, LDC exports will expand, with sportswear offering a major opportunity. Today, some 75 per cent of world sports footwear is produced in East and South-East Asia, because complex upper stitching requirements have made it prohibitively expensive to manufacture in high-wage economies.

Global footwear output is projected to reach 15 billion pairs by 2002. Low-cost producers have an intrinsic advantage and the acquisition of the new 'JIT' and 'quick-response' technology is not prohibitively expensive, as many of the 'second-generation' Asian economies have shown. Markets will not be in Europe and America where *per capita* shoe consumption approaches six pairs a year, or where population growth is slowing and population is aging. The market for the future is in countries with *per capita* consumption rates of less than three pairs and with a factor cost structure which makes it efficient for them to either move out of shoe production or produce higher-quality shoes. Such markets exist for LDC producers in West Asia, Latin America, to a lesser extent in South-East Asia and pre-eminently in Africa.

The real challenge is to target lower middle-income groups within these markets and to mass-produce standardized, cheap but durable footwear for domestic consumption as well as export. French companies in North Africa are exploiting these opportunities by concentrating on the production of lower-priced shoes. Success in attracting foreign investment depends on developing a managerial and production system geared to on-time delivery, productivity growth and quality control. While low labour costs and tax incentives are necessary, they are nevertheless insufficient to induce location by major international manufacturers.

The global footwear commodity chain has facilitated a diffusion of production skills from high- to middle-income countries. But as production skills have diffused, profits have become concentrated in designs, brands (especially in sports shoes) and buying skills. Manufacturers in developed countries have become buying agents and it is they who organize entry of third-world producers, such as Brazil and China, into major consumer markets. Marketers provide both production and organizational knowledge and skills to suppliers. As wage rates rise in a supplier country (Brazil, Taiwan Province) marketers move their investment to lower-cost countries (China, Mauritius).¹⁴ Gains from the temporary presence of a chain leader can, thus, be sustained only if the host industry has learned to develop design and marketing capabilities during the period of its presence.

LDCs with considerable potential in the footwear industry include Bangladesh, Ethiopia, Nepal, Malawi, Myanmar, Somalia, Sudan, United Republic of Tanzania and Zambia. Bangladesh, Ethiopia and Sudan have made significant progress. In LDCs, development has been constrained by low capacity-utilization rates, poor quality of raw materials, escalation of import input costs (a consequence of continuing devaluation), control of the industry by a small number of firms, obsolescence of production technology and poor storage facilities.

Leather products branches are generally thought of as users of fairly standardized technologies. Yet, the most dynamic segment of the leather products group – footwear – has been strongly affected by developments in electronics and IT. The link binding manufacturing and distribution operations is CAD/CAM technology plus associated sophisticated transmission systems, utilisation of which is forecast to expand rapidly over the next decade.

The new generation of 3- CAD systems are highly user-friendly, offering so much flexibility and time saving that they are bound to appeal to designers who are conversant with IT. The ability to realize completed designs in full colour and texture on the screen with accurate costings is a benefit which no shoe manufactures will be able to ignore in the long run.

Shoe making has increasingly become an assembly operation, demanding accuracy in materials and components. Many operations have already been significantly de-skilled and this trend will continue. More robots and pick-and-place devices will be used in both traditional line assembly systems.

While conventional shoemaking technology still holds sway, computer-generated data is the key to the future for efficiency, linking various component parts of a design to manufacturing operation. CAD/CAM technology offers a potential for using design data directly downloaded to the shop floor. Once in place, distance will become irrelevant, overcoming a further hurdle to a multi-location shoemaking enterprise. International footwear conglomerates are making use of Internet facilities to market their products. Widespread application of this computer-based technology of instant worldwide communication, both within companies and between suppliers and manufacturers and customers, is expanding rapidly.

LDCs have a clear comparative advantage in shoe making – a labour-intensive industry with strong demand in neighbouring developing country markets. To exploit these opportunities technological upgrading is needed in LDC shoe making operations. This will involve: (a) strategic links with international firms to ensure access to technology, knowledge and markets; and (b)

production system upgrading and re-organization at the shop-floor level to improve product quality and reduce delivery time.

Opportunities exist in the following areas:

- Re-capitalization of existing firms can fruitfully involve foreign investors. To this end, an attempt could be made to incite the interest of Spanish, German and Italian companies in particular to establish subsidiaries and joint ventures in African LDCs. Such cooperation can be very useful leading to a gradual transfer of leather and shoe-making technology and a reduction in the import intensity of investment in this sector.
- South African companies can also be important investment partners. Many South African firms are expanding into low-income countries and there are growing opportunities for outsourcing linkages with African LDCs. Footwear manufacture is one such possibility. In South Africa, which has some of the most successful tanneries in Africa, labour costs are rising rapidly. It would, therefore, make good economic sense to relocate some activities to lower-cost LDC sites.
- Leather products are also a very important industry for Bangladesh and Nepal. Here the principal concern should be the replacement of obsolete machinery and product quality standardization and upgrading.

E. Agricultural machinery

The major portion of the agricultural machinery needs of commercial and large-scale farms are met by imports. As the foreign exchange constraint has tightened, agricultural machinery imports have fallen in many LDCs. However, equipment and tools required by small holders and commercial cultivators cannot be classified as "machinery". Moreover, their needs are met by artisanal units.

Two main types of equipment are essential – those needed in the construction and maintenance of irrigation systems and those used in agricultural production. The primary purpose of local production should be to meet the demand of small holders, thereby enabling them to raise productivity. In South-East Asia, the establishment of farmer cooperatives for purchasing and distribution has played a useful role in converting potential into effective demand for agricultural equipment among small holders. Agricultural financing systems make credit available to both consumers and producers of agricultural equipment. However, insurance facilities to safeguard producers against fluctuations in sales are also needed.

Adapting agricultural mechanization to local needs requires that the provision of machinery be accompanied by the creation of local capacity to unpackage it and adapt it to local conditions. Technology transferred should preferably be simple and cheap. Where possible, local sourcing should be considered, thereby partially relieving farmers from incurring increased foreign exchange costs caused by currency depreciation.

The switch in so many African LDCs from mechanized to animal traction reflects high repair and maintenance costs, on the one hand, and scarcity of credit, on the other. Often too, it reflects inappropriate design. Imported products are often either unused or under-used, as in many countries the agriculture machinery industry has remained stagnant for several decades. Production has

remained confined to very simple hand tools manufactured locally by village craftsmen and artisans. Tractorization and harvesting techniques have not been transferred to the most vulnerable food LDCs and scarce foreign exchange contributes seriously to retarding the development of agricultural mechanization. The abandonment of tractors and other agricultural mechanical equipment assumed crisis proportion during the 1990s in some African LDCs. ODA funds could be used to ease such constraints.

An important concern should be to integrate the actions of informal and formal sector establishments. Informal sector enterprises could be upgraded, for example, by providing facilities for the joint purchase and use of equipment, casting and forging facilities. Development of prototype designs and provision of services for testing agricultural equipment can stimulate the upgrading of village blacksmith-type operations and their gradual integration into the formal sector. Mobile demonstrations and exhibition workshops can play an important role in upgrading technology. This can be particularly useful in introducing watershed management, pumping and tillage techniques and equipment for various types of irrigation, including the construction of canals, reservoirs and wells.

F. Information and communication technologies (ICTs)

In common with almost all aspects of global business, LDCs are being affected by the rapid growth of ICTs. Productivity growth is becoming increasingly reliant on the progressively wider application of ICTs to re-engineer business management processes, reorganize supply chain relationships, eliminate waste and improve customer service. SMEs can benefit from low-cost access to global markets through the Internet. Provided the necessary infrastructure is in place, electronic communication drives down procurement costs and facilitates JIT production. ICTs can be used also to build up strategic partnerships among firms.

While joining the ICT revolution is desirable – indeed to some degree inevitable – LDCs must create the necessary environment and physical infrastructure, both traditional and non-traditional. One of the few African LDCs with a successful ICT strategy is Mali, which has encouraged the growth of public access points, such as cyber cafés, resulting in a fivefold increase in connectivity during 1997–2000, albeit from a tiny base. There are plans to connect all 701 communes in the next two years and the government is seeking to create a competitive environment for the telecommunications sector. Some small-island states have invested in ICTs to boost tourism, exports, financial services, monitoring of fishing practices (especially in the Pacific islands), tele-medicine and distance education services.¹⁴

The continuing decline in information-processing costs is making ICT products and services increasingly accessible to LDCs. The range of know-how and know-why that can be purchased by LDCs is increasing with far-reaching positive implications for productivity growth. Business-to-business e-commerce is preferred to business-to-customer's applications since the former facilitates the growth of SMEs. The automotive industry's use of relatively small suppliers and the appearance of electronic marketplaces bringing together a critical mass of buyers and sellers can be fruitfully exploited by LDCs. Some Asian LDCs have succeeded in attracting FDI in customer support, airline ticketing and electronic publishing. To attract such FDI, LDCs must access low-cost digital communications technology, while developing an appropriate skills base.

ICTs can help reduce income inequality by focusing on production and distribution processes that enhance food security. It will also contribute to skills development that will boost productivity in food processing and help develop information systems on food availability and distribution. Underdeveloped physical infrastructure is inhibiting the application of ICTs to food security systems but new technologies, including wireless access through digital mobile phones that allow leap-frogging, are becoming increasingly viable in LDCs.

The most important initiative for enhancing “pro poor” ICT use in LDCs is in the development of telephone services in rural areas through widespread use of small-scale exchange systems, using digital technology.¹⁵ In Bangladesh, the large-scale appearance of telephone shops in towns and villages has facilitated the growth of e-commerce transactions and micro finance. Grameen Telecommunication has proved to be a successful venture of Grameen Bank, a provider of micro finance. Using solar energy, Grameen Telecom provides cellular mobile services to 60,000 villages by establishing a digital, cellular radiophone system, able to provide telephony where wire or fibre infrastructure is not available. The services are provided through telephone shops owned by Grameen Bank borrowers who finance the purchase of telephones. Telecentres with Internet and other basic telecommunication facilities have appeared in Bangladesh, Mali, United Republic of Tanzania and some other LDCs, but their success depends on providing training to customers. The language barrier is a major constraint on the growth of telecommunication facilities in LDCs.

The growth of ICTs usage in LDCs depends crucially on domestic demand-oriented policy initiatives of national governments. TNCs are unlikely to facilitate this since their operations exploit cheap labour resources, leading only to limited transfer of skills and technology. Empirical studies at industry level show that TNCs use globalisation to strengthen their dominance of world markets, creating only relatively low-skilled jobs in non-core countries. In the hard disk drive segment of the computer industry, product development is concentrated at the core, while assembly operations are geographically dispersed. Some fabrication activity may be located in developing countries, though seldom in LDCs. As in the footwear industry, activities shift with rising wages.¹⁶

Some LDCs may attract some low-wage investment projects, but their capacity to retain them depends on whether the investor is permitted to retain the bulk of the productivity gain. High-skilled jobs remain concentrated in the core countries, though agglomeration effects offset this to some degree.¹⁷ An effective regulatory regime, appropriate infrastructure and liberal tax policies can together accentuate agglomeration effects, but the key factor is the ability to increase relative labour productivity while retaining a relatively low-wage structure. There is little evidence of production or organizational technological diffusion to low-wage countries in this industry.

The highly-globalized computer industry, which is at the heart of ICTs, has barely touched the LDCs. Structural change in the computer industry during the 1990s included large numbers of new entrants supplying small systems and personal customers. Specialized areas (technical work stations, super computers, computer services) have, thus, assumed increasing importance with increased opportunities for external sourcing of components and software. While the industry is highly R&D intensive, over 90 per cent of R&D activity takes place in core countries.

Market dominance of major players in the industry is reflected in the high level of intra-firm trade, particularly in the United States. Core country governments seek to ensure that the innovating company's property rights are protected and copyright protection of software is increasing. Larger developing countries (Brazil, China, India, Malaysia and Pakistan), not LDCs, are likely to be major

beneficiaries of these developments, though there is scope for some LDCs to develop inter-firm linkages with regional firms. Firm collaboration is very common in the computer industry and there is scope for regional dispersion of investment capacity, especially in East and South-East Asia.

There is also little scope for efficient LDC integration into any major segment of the consumer electronics industry. A relatively small number of major firms dominate this industry, and worldwide sourcing by major players has increased with the decline in protection levels in the late 1990s. Inter-firm collaboration agreements and vertical integration has increased but is driven by a quest for risk sharing of costly R&D investment. Accordingly, LDCs are unlikely to emerge as major sites for consumer electronics activities, other than possibly assembly processes.

Because consumer electronics plants play a key role in technological upgrading in the economy, there are strong grounds for encouraging local production of transistor radios, refrigerators and small generators in LDCs. This will stimulate engineering industries while building technological capabilities and supplying incentive goods for agricultural producers. Such products utilize standardized technologies that can be relatively easily assimilated by LDC firms.

Information technology dissemination in LDCs

Four major avenues are available:

- Public services: most public services (healthcare, education, law enforcement and tax collection) would become more efficient as a result of efficient investment in ICT. At the same time the efficient use of ICTs requires stable energy sources.
- Private services to manufacturing firms: Manufacturing growth in LDCs is constrained by underdeveloped back-up services – retailing, insurance, finance and IT. It is in these service industries that ICT applications have had a lasting impact on advanced economies. IT investment in services could pay rich dividends in the LDCs, contributing to enhanced production efficiency in manufacturing.
- At managerial and organizational levels, ICTs have a direct impact on manufacturing through the adoption of such techniques as JIT and total quality management.
- ICT impacts directly on manufacturing productivity and efficiency through the application of CAD/CAM techniques and the use of computer-integrated manufacturing. Even basic labour-intensive activities are likely to incorporate some sort of IT in the near future. Global manufacturing is increasingly characterised by greater flexibility, faster response to customer demands and increased attention to quality, thereby forcing firms to improve the way in which they store and transmit information. As ICT equipment costs fall, some of these technologies are becoming increasingly viable - even for small businesses.

Even though the development of a full-scale computer industry is not possible in most LDCs at this stage, some could seriously consider investment in limited hardware segments to improve export competitiveness in textiles and clothing. The existence of advisory support services is essential, especially in the case of complex industrial applications.

The boundary between the application of support services and the software industry is not very clear, since support operations can develop into programming capabilities, only a step away

from software production. The successful Indian software industry is an example of what can be achieved in a developing country. The crucial role of human capital in the form of relatively advanced skills cannot be under-estimated.

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- 1 UNIDO (1997 (A)); (1997 (b)).
 - 2 UNIDO (1997a) estimated revealed comparative advantage ratios for a number of agro industrial branches in 30 African LDCs for 1985, 1990 and 1994. Thirteen LDCs displayed positive RCA values for the food-manufacturing group in both years. There was a tendency, however, for maximum RCA values to decline during this period. UNIDO 1997a (pp. 14-18).
 - 3 For a detailed review of the problem and prospect of African food manufacturing industries see UNIDO 1997b (Sec. IVa).
 - 4 UNIDO (1997(a)) Appendix table.
 - 5 UNIDO (1997 (b)) pp. 94-95.
 - 6 UNIDO (1997 (b)).
 - 7 UNIDO (1997 (b)) pp. 76-78.
 - 8 Byerlee and Eicher (1996).
 - 9 Dibley (1995).
 - 10 Kratinger and Rosemarian (1994).
 - 11 Sasson, 1993
 - 12 Kaplinsky (2000), p. 11.
 - 13 Garziani (1998).
 - 14 Gereffi (1999), p. 53.
 - 15 Schmitz et al (1998).
 - 16 James (2000, pp. 771-778.
 - 17 Gourevitch (2000), p. 313.

4. Policies for Capacity Building

A. Objectives

There is growing consensus that a main concern of industrial policies and strategies in LDCs should be poverty alleviation through industrial development. Emphasis should be placed on building capacity necessary for successful LDC integration with the global industrial economy. Building capacities of the poor and disadvantaged sections of the global community is a requirement for reversing marginalization of LDCs and for improving the position of the poor within LDCs.

Sustainable poverty reduction through industry requires:

- development of a coherent system-wide industrial strategy;
- improvement of industrial governance processes and the development of a supportive institutional infrastructure;
- strengthening of micro, small- and medium-sized enterprises and creating sustainable employment;
- upgrading technological capacities and skills and increasing LDC access to knowledge and modern technology; and
- effective integration of LDCs into global production networks.

An analysis of these and related issues is presented in the following sections.

B. Industrial governance: strategies and policies

Industrial strategies must focus explicitly on alleviating poverty by increasing poor people's access to productive assets and developing their knowledge and skill base that enhances the contribution of industry to sustainable employment and poverty alleviation.

The formulation and implementation of an integrated industrial strategy implies the redesign of policy-making and administrative institutions. National level consultative mechanisms, involving both public and private sector decision-makers, should be established or enhanced. Industrial strategy should emphasize competitiveness through the creation of new skills and fostering restructuring of manufacturing firms, including cross-border and domestic strategic alliances, designed to exploit modern technologies and new organizational systems.

This requires a stronger capacity for norm setting, ensuring compliance and promoting internationally-competitive firms by providing a functional, informational and regulatory framework (Box 4.1). Dialogue and support are most effective when it is local, since the policy maker is typically closest to the producer and capable of adapting the policy initiative to the market environment.

Industrial strategy involves:

- Identifying existing or potential industries and firm clusters with greatest potential for sustainable employment that can be promoted with the limited resources available.
- Identifying measures, which can be taken to increase the technological and human skill capacities of these firms and industrial clusters.
- Developing a financial strategy for funding the capability strengthening measures at the firm level. Self-financing by firms should be encouraged.
- Devising an institutional mechanism for delivering support inputs to firms as well as for monitoring firm performance.

Box 4.1. Capacity building for private sector development in Chad

In the mid-1990s, Chad emerged from nearly three decades of domestic strife and external conflicts, which had wrecked institutions and infrastructures, squandered human resources, and severely restrained economic progress. Compounded with the high transport and transaction costs inherent in its landlocked situation, the country was facing daunting challenges along its development path.

The Government's recovery programme first concentrated on restoring the legal foundations of the Chadian society, from the Supreme Court down to the Business Law and its enforcement tribunals. In parallel, the country initiated in 1995 its first structural adjustment programme, followed by reforms of the civil service and the gradual establishment of a policy and institutional framework conducive to a greater participation of the private sector in economic affairs.

Along the way, UNDP and UNIDO supported the efforts of the Chadian authorities with advisory services towards establishing a viable business environment: the legal framework, the tax regime, financial intermediation towards the enterprise sector, a trade code, an investment charter, normalization and quality management institutions, and the simplification of administrative procedures applicable to private businesses, were some of the tangible achievements of this first phase.

A second phase under progress since early 2001 focuses on the organization of the local private sector. The Chamber of Commerce and Industry is reactivated, and is expected to be financially self-supported within a year. A client-driven range of services is elaborated on the basis of a survey of private enterprises, and is gradually taking shape around the Chamber's core competencies of professional training. The aim is to see the institution emerge as a premier centre of information on the country's private sector, its constraints, and possible solutions to the obstacles it currently faces.

In a third phase to be launched later in 2001, the UNDP/UNIDO project will contribute to stimulating economic exchanges in domestic markets. The landlocked situation of the country and its weak infrastructures make for punitive transportation costs to the main ports on the Red Sea, the Gulf of Guinea and the Mediterranean. At the same time, the agricultural sector and the growing oil industry generate a substantial stream of revenues that must be channeled to local markets and trigger a domestic supply response. The project will assess such prospects in the food processing and housing industries in particular, and determine the scope and extent of stimuli that would provide the initial impetus to economic development.

In the vast majority of LDCs the abundance of unskilled labour means that relatively low-technology industries will predominate. Continuous upgrading of capabilities and technical and organizational development of firms in these industries is needed in order to compete both at domestic and international markets.

C. Institutional infrastructure and public-private partnership

Effective industrial governance requires strong emphasis on building public-private partnerships, which can be particularly effective at the local level (Box 4.2). Local initiatives must be integrated with national industrial policy, and can be particularly useful in developing regional clusters. Public-private partnerships should target specific goals - job creation and improved service delivery.¹

Fostering purpose specific public-private partnerships can include:

- improvement of the business environment
- provision of basic infrastructure, education and training
- fostering inter-firm networking
- providing business services, and

- strengthening community ties.

Box 4.2. Public-Private Partnership in Tanzania

Many countries have developed holistic approaches that include all stakeholders of the society and facilitate interdependent relations among government, enterprises, and consumers. Therefore, governance must become more people-centred and embrace the idea of a partnership between the government and the private sector. The United Republic of Tanzania adopted this concept in its 'National Development Vision 2025' that is utilized by the 'Tanzania National Business Council (TNBC)'. In line with the Vision 2025 the TNBC defined its role in the development process as follows (TNBC 2000):

- Providing a forum for public-private sector dialogue and to reach consensus on strategic issues.
- Promoting the goals of economic growth with social equity.
- Reviewing the developments in the external and domestic business environment and its implication for the United Republic of Tanzania.
- Exchanging views on the regulatory environment, and proposing ways to facilitate public service.
- Proposing changes in the policy environment in order to enhance the attractiveness of the United Republic of Tanzania for investment.

Realizing that the TNBC cannot be a panacea in shaping government-industry relations the Vision 2025 emphasizes the importance of sectoral associations with the technical capacity to diagnose and analyse sectoral and competitiveness issues. As President Mkapa of the United Republic of Tanzania mentioned in his speech inaugurating the Council in April 2001: "The TNBC cannot be a single channel of contact mechanism between the Government and the private sector. Contacts between line ministries and agencies and their client sectoral or sub-sectoral associations have to continue because implementation bottlenecks will still have to be solved at those levels. For that reason, each ministry must identify its customers, maintain a continuous dialogue with them and understand their operational problems, and their aspirations".

The United Republic of Tanzania is not alone in its recognition of the importance of public-private consultative mechanisms. UNIDO is also assisting Ghana, Mozambique, Nigeria and Ethiopia to go through the process of setting up their own national consultative platforms.

Comprehensive guidelines for the organization and operation of public-private consultative mechanisms and partnerships at the macro and meso (cluster) levels have been developed by UNIDO, emphasizing the need for clear governance rules at the macro level and the development of a strong institutional framework to support private enterprises at the meso-level. Strong initiatives at an early stage and consistent policy support by the government over an extended time period is vital for the development and efficient performance of industrial clusters in developing countries. Emphasis should be placed on providing institutional support to the private sector in the form of training and access to technologies and market information.

What is needed is an industrial institutional infrastructure centred on industry associations capable of fostering technological upgrading and skills development programmes. The development of cluster-level institutions is necessary to ensure improved communication between national policy makers and local firms.

A major objective of policy-making must be the reduction of high transaction costs, which are a major obstacle to industrialization in LDCs, sub-Saharan Africa, in particular.

D. Entrepreneurship, enterprise development and role of SMEs

This requires:

- designing appropriate SME strategies at the local, national and regional levels.
- establishing an institutional framework for SME policy conception and implementation.
- strengthening SME representative institutions and supporting their participation in policy-making and implementation.

SMEs are overwhelmingly important in LDCs as providers of manufacturing value added and employment. Their growth constitutes a major mechanism for poverty alleviation through

the development of rural entrepreneurship and agro-industrial programmes (Box 4.3, Box 4.4, Box 4.5)

Box 4.3. Rural entrepreneurship development programmes

Rural entrepreneurship development programmes seek to:

- create an enabling rural business environment;
- increase entrepreneurial awareness of regulatory procedures;
- strengthen local service capacities, both technical and managerial, and enhance information transmission, storage;
- promote bulk procurement and joint marketing; and
- improve enterprise access to finance - both formal and informal.

UNIDO Integrated Programmes for Eritrea, Guinea, Rwanda, United Republic of Tanzania and Yemen incorporate efforts for establishing an effective policy and institutional mechanism for promoting SMEs. Programmes in the United Republic of Tanzania seek to upgrade entrepreneurial skills in the food manufacturing industries. The programme for the United Republic of Tanzania showed that entire villages gain by the installation of an agricultural material processing unit, the provision of entrepreneurial skill development programmes and the establishment of an institutional support system at the village level.²

In Guinea, a private sector development programme is underway. This has led to a restructuring of the National Chamber of Commerce and Industry. Assistance is also provided for the development of business centres, SME network and cluster formation in developing countries.

Small and micro enterprises in LDCs are usually survival mechanisms – exploiting diseconomies of scale, thriving on informal contacts (especially for information and credit) and absorbing displaced labour from agriculture, large-scale manufacturing and the service sector. They proliferate at a rapid rate, survival rates are low and only a minority of small and micro enterprises graduate to the formal sector.

Box 4.4. Building productive capability – Uganda

Food security is a government priority and UNIDO is providing assistance to improving the quality of fish products to meet EU safety and health standards. Officials were trained from the fish inspection services and the National Bureau of Standards and prepared a fish inspection guide. A code of practice was put together for producers. Eventually, adherence to this code will be a precondition for enterprises wishing to join the Fish Processors and Exporters Association. Lack of facilities to test and analyse fish products resulted in an export ban on Ugandan fish products. Samples are sent to Europe for analysis to overcome this problem.

The absence of adequate quality control facilities in Uganda is being addressed in another component of the programme. As a first step, measures are being taken to obtain an existing microbiology laboratory accredited through an accreditation body in Europe. This will be followed by assistance to other laboratories.

Women in rural areas struggling to make a living from Uganda's rich leather and hides resources now have a chance to upgrade their skills. One of the earliest achievements of the Uganda integrated programme was the establishment of a leather goods manufacturing department in the Kampala-based Training and Common Facility Centre.

Other achievements of the Uganda programme include a master craftsman programme to upgrade the skills of entrepreneurs and improve the productivity, design and management practices of small- and medium-sized enterprises in Uganda. One of the country's most promising commodities is coffee and assistance is being provided to find business partners outside the country to invest in a scheme to develop value-added coffee products instead of merely exporting raw beans.

Another activity that is proving successful is the formulation of a business plan for the establishment of a national information network. The network brings together public and private institutions, SMEs and providers of information in a commercial company. Support has also been provided to create an industrial park.

This is in sharp contrast to the experience of small firms in many developed countries. Italian and Spanish small firms have achieved high levels of collective efficiency by networking and sharing technology and resources. They are of considerable importance as subcontractors and component suppliers to TNCs in Japan, where dynamic small firms have contributed substantially to flexible specialization and mass customisation. Fostering subcontracting arrangements through suppliers has been pioneered by UNIDO. Such subcontracting arrangements are expanding in developing countries, such as Viet Nam, where Unilever's supply network has been extended to include several SMEs.

It must be stressed that improving industrial efficiency must involve the growth of collective efficiency within the small sector. Without this collective efficiency in the SME sector, the adoption of mass customisation techniques - JIT and total quality management- is unlikely

to take place. Weaknesses in the industrial supply chain are among the most important factors constraining new organizational technologies in LDCs.

Box 4.5. Building productive capacities: Burkina Faso

The Burkina Faso integrated programme focuses on the country's agro-industrial sector, with particular reference to food manufacturing, leather and textiles. These form the three main components of the programme and are supported by three additional components – SMEs, quality and investment promotion – that will help ensure the sustainability of the country's industrialization efforts.

UNIDO launched the programme in April 1999 with the aim of improving the performance of manufacturing units and creating value added for the country's exports. As a starting point, good manufacturing practices and hazard analysis and critical control points were introduced in 14 food manufacturing enterprises. The University of Agriculture and Forestry of Vienna collaborated in the construction of a new hybrid dryer using solar and fuel energies for fruits and vegetables. Training and equipment to a demonstration cereals extrusion unit within the University of Ouagadougou was also provided.

In the course of 1999, Burkina Faso's integrated programme enabled leather artisans to improve their product range of footwear and leather products and make optimum use of discarded materials. In addition to training, leather workers each received a set of hand tools to help them start up on their own. Eventually, it is hoped to create cooperatives of leather craftsmen who could share premises and equipment. Environmental protection is always a concern in the leather industry and chrome-recovery units at tanneries were therefore established.

Technical training was provided to artisans and a technical assistance programme for the rehabilitation of the textile sub-sector in Burkina Faso was prepared. The first step was the establishment of a Federation of Textile Artisans. This Federation is working jointly with national experts to implement the textile sector strategy. An important part of the integrated programme is putting in place the appropriate institutional infrastructure. A Small- and Medium-sized Enterprise Promotion Unit was set up in Ouagadougou, and a second one is being created in Bobo-Dioulasso with trained staff and necessary equipment. A standards unit was also created as a first step towards upgrading Burkina Faso's standardization and metrology laboratories. Similarly, an investment promotion unit was created within the Ministry of Industry that will eventually evolve into a fully-fledged investment promotion agency. An investment guide has been published and a set of 60 investment projects has been prepared. Several of the investment opportunities identified supplementary activities to be undertaken under other components of the integrated programme.

Appropriate policies should be adopted to encourage industrial clustering among small and micro enterprises and to foster closer links between major producers and their suppliers. While research shows that governments can do little to *create* industrial clusters, they can do a great deal to foster them once they have emerged. Moreover, as far as small- and micro-enterprise clustering are concerned it is the local/municipal government (and not a federal or provincial authority) that has a key role to play. With government support, private sector industrial associations should become the main conduits for the transfer of information technologies, marketing and training support to individual entrepreneurs.

Such associations can become nodal points for the delivery of services and support to SME clusters, while commercial users and distributors of SME products can also play a similar role. A move from generalized sector support to the achievement of specific output and organizational efficiency benchmarks would yield significant benefits.

Everywhere in the world growth of small businesses is inhibited by scarce – and costly – credit. Many innovative schemes have been developed but they have suffered from two structural weaknesses:

- They are invariably operated by NGOs with social, rather than commercial, orientation, thus, hampering efficient resource allocation.
- Even high-profile schemes, such as Grameen Bank, are heavily subsidized by external sources and are concerned primarily with employment growth. Loans are often very small and inadequate to meet technology upgrading needs necessary for firms to make the transition to formal medium-scale status. Such NGO-run schemes cannot make a major contribution to solving the “missing middle” problem in LDCs, particularly in Africa.

Successful micro-finance schemes should:

- be sponsored by commercial banks, though the business orientation of foreign banks may make them unsuitable;
- provide supervised credit in tailored financial packages – such as leasing machinery;
- become fully self-sustaining and market competitive within an 18-month period, and not subsidize credit.

In a knowledge-driven economy, governments must develop an enterprise policy, centred around entrepreneurship which is the key resource. This implies encouraging risk taking and building a dynamic environment in which enterprises innovate and grow. Policy benchmarking and the provision of support networks and services are crucial to the success of such a strategy.³ Assistance is, therefore, needed to enable LDCs to develop policy benchmarking and institutional support systems for technological upgrading of SMEs.

E. Technological upgrading and learning

Absorbing and adopting technologies require upgrading of skills. It is essential to assist LDCs to locate and acquire new technologies, especially in ICT-related areas. This assistance could focus on:

- Development of negotiation skills in technology transfer deals.
- Establishment and upgrading of national and regional technology centres and associated networking with business.
- Establishing and supporting national and international supply network management systems to integrate LDC suppliers into global value chains and international networks and, thus, foster commercial and technical partnerships and inter-firm strategic alliances.

Technological upgrading in LDCs depends both on the capacity of firms to absorb and exploit existing technologies. Since such technologies rarely reflect LDC factor endowments, environments and needs, customisation is essential. Given LDC resources and opportunities, innovation should take the form of ‘widening’ rather than ‘deepening’. This requires a rapid build-up of the applied science knowledge base and easy access to external sources of knowledge. Industries in which LDCs are likely to have international comparative and competitive advantage are those frequently characterized by such “widening innovation” systems and technological regimes.⁴

Innovation and diffusion of technology are inseparable processes and firm-specific technological and system-wide economic changes invariably go hand in hand. Innovation must be guided⁵ especially since it is not a spontaneous market-generated process.

Central to technological change is the learning process. Learning is costly. It occurs in different parts of the firms and involves continuous interaction between internal and external sources of knowledge. It is cumulative based upon interaction and exchange of information between localized incremental innovators. “Learning by using” is often as important as “learning by doing”. Learning is not confined to formal R&D programmes. Increasing firm productivity requires integrating R&D programmes with the firm’s production and distributive activities.

It has been argued that little innovation and technical change takes place in developing countries, particularly LDCs.⁶ In these countries technological progress can be achieved by learning to apply imported technology-intensive capital goods from industrialized economies.

From this perspective it is essential for local industry to learn and upgrade capabilities for absorbing new technologies.

The “evolutionary” approach has long held that technological progress is not something that firms can passively buy in. Technological change is endogenous – rooted in firms’ capabilities and dependent on, and sustained by, government support. In LDCs, technological change processes are often located in network structures linking clustered firms with external knowledge-generating institutions.⁷ It has been shown that participation in “open” knowledge systems is particularly important and it is not possible for clusters to sustain innovation only on the basis of endogenous incremental change.

Large firms within clusters are critically important in providing new knowledge, as are public support organizations and enterprise associations. Knowledge flows often take the form of interaction within the global value chain. Managing knowledge systems and creating vertical linkages between production systems to facilitate knowledge flows is important for sustaining diffusion and innovation. The importance of creating knowledge systems increases as an LDC moves up the value chain – e.g. from yarn to apparel.

Markets cannot provide a sufficient quantity of required skills at the right prices for the development of “widening” innovation systems.⁸ As a result, firms often operate with low-skill, stagnant technologies. Government promotion of skills requires intervention in many markets.⁹ When governments seek to change the technological structure of industry they create a need for new skills. These needs can be satisfied by an effective co-ordination of the development of the production system, on the one hand, and the education and training system, on the other.

The need for government support to provide for skill development is greatest in those LDCs where factor market failure is greatest.¹⁰ Benchmarking of education and training systems against those of other developing countries can be crucial. Support could also be provided for the development of training systems at firm and meso (industry association) levels.

Skill requirements of LDCs are massive, especially in some of the larger ones, underlining the need for in-firm training. This could be fostered by skill development funds financed from payroll taxes. Policy should be designed to encourage TNCs to transfer some R&D activity to, and participate in, the development of a national training infrastructure. Most importantly, measures are needed to enhance training of SMEs.

The pace of technological change has accelerated over the past 20 years – especially with the development of “generic technologies” in information, biotechnology and new materials. Obtaining access to such technologies is expensive. New technologies have impacted on traditional labour-intensive industrial branches, such as textiles, clothing and food manufacturing. A major challenge facing LDCs is to achieve an effective mix of usage of semi-skilled labour with computerized design leading to standard production methods.

The new, rapidly evolving generic technologies offer many opportunities and challenges, encompassing new products, services, markets and businesses. Their impact is felt across the industrial spectrum, improving competitiveness of products and processes in firms. New materials improve product specifications and lower production costs in engineering and chemical industries; biotechnology saves energy and raw materials in chemicals, pharmaceutical and food processing. Pervasive application of information technologies allow companies in all industrial sectors to reengineer critical processes, improve overall efficiency and re-architecture their businesses with participation of clients, suppliers and all internal functions, made possible through electronic networks and information access.

Box 4.6. Technology upgrading programmes

Transferring new technologies and upgrading production systems are essential components of the Integrated Programmes launched by UNIDO in Burkina Faso, Guinea, Rwanda, Uganda and United Republic of Tanzania. Public-private partnerships are also used to bring together multinationals, governments, business schools and donor agencies for utilizing modern technology for standardization and quality upgrading of industrial components, such as auto parts and machinery produced in developing countries. UNIDO's extensive work in the field of metrology, standardization and certification has led to technology upgrading and transfer in LDCs. In Uganda, a laboratory was established to reduce fish contamination. Pesticides analysis kits have been introduced and certification procedures implemented in Guinea. Upgrading quality control and introduction of standardization are also important components of UNIDO programmes in Ethiopia and Rwanda. In Burkina Faso, the UNIDO programmes have led to the introduction of good manufacturing practices, hazard analysis and the development of critical control points by several manufacturing enterprises. The work of UNIDO's Technology and Investment Promotion Offices, based in LDCs, seek to construct and promote Industry and Technology Promotion Networks bringing together several stakeholders for subcontracting strategic partnership and knowledge exchanges among firms.

Benin and Togo have benefited from introduction of new technology for water pollution control and bio-diversity conservation. In the area of renewable energy technologies, UNIDO's International Centre at Hungzou, China, could lead to the transfer of small hydropower technologies, especially to Asian LDCs. They can also benefit from the work of the International Centre on Solar Energy, which currently has projects in Indonesia and Malaysia. National cleaner production centres have been established in Ethiopia, Mozambique and the United Republic of Tanzania. The centres have initiated work for the cleaner production and marketing of sisal, heneguin, bio and botanical pesticides and non-woody fibrous material. Waste management technologies are also targeted.

UNIDO is playing a major role in implementing the recommendations of the Montreal Protocol to eliminate ozone depletion potential. Sectors covered are aerosols, foam, fumigants, refrigeration and solvents. Phase out of methyl bromide is specially targeted. Africa is the world's second largest consumer of methyl bromide and one third of UNIDO's projects in the fumigant sector are concentrated in Africa.

Technology introduction and upgrading in LDCs has also benefited from the wide range of activities undertaken by UNIDO in collaboration with other UN agencies. Co-operation with the Common Fund for Commodities provided assistance for jute manufacturing in Bangladesh. UNIDO participated in an EU-funded programme of technological assistance to the West African Monetary Union. Collaboration with the International Fund for Agricultural Development led to the provision of technological assistance to rural women in the food-processing industries. UNIDO and UNCTAD participated in innovation policy review and enterprise development programmes in Burkina Faso and Ethiopia. Entrepreneurs and policy makers from several LDCs participated in events to forge partnerships for the production of alternative materials for low-cost housing. This event was organized in association with the International Centre for the Advancement of Manufacturing Technology.

Creating an indigenous technological capacity is clearly essential. Some LDCs, such as Bangladesh, Lesotho, Myanmar, Ethiopia and Sudan, may gain from TNC redeployment of research activity to lower cost sites. But such gains are likely to be marginal. A much more productive policy initiative is the creation of an institutional framework for the sustenance of strategic alliances between local and foreign firms – especially firms from Brazil, China, India, Taiwan Province, Thailand, Malaysia and other advanced developing countries capable of providing the range of technological products and services that LDCs need.

Technology policy should take account of local conditions and levels of development. At early stages of assembly operations, standard technologies and engineering skills are of primary importance, whereas FDI and licensing are not. Technology is typically obtained by importing capital equipment.

Technology prices should aim at stimulating market demand for innovation and establish a domestic capacity for the management of R&D systems. International competitiveness requires that firms grow rapidly through technological learning. Buyers – anxious to ensure product quality – can help in technology sourcing, while governments can also play a catalytic role by setting ambitious targets and linking the provision of support to achieving these targets. Technological upgrading can also be stimulated by encouraging the growth of venture capital firms.

F. Finance and investment

LDCs remain strongly dependent on ODA flows. During 1990-1998 ODA accounted for about 86 per cent of net inflows on an annual average basis.¹¹ Aid inflows¹² equalled 70.6 per cent of gross domestic investment (GDI) for African LDCs during 1996-1998. For Asian LDCs the average aid: GDI ratio during 1996-1998 was 22.6 per cent. For developing countries as a whole, aid accounted for 1.5 per cent of GDI during 1996-1998.¹³

Official net resource inflows to LDCs declined 26 per cent, in nominal terms, from \$12.3 billion in 1992 to \$9.0 billion in 1998.¹⁴ This decline was not associated with improved aid utilization efficiency.¹⁵ Increasing aid efficiency requires utilization of aid for improving productivity. There are no grounds for expecting better institutional response to falling aid volumes in recipient countries.¹⁶ The proportion of aid allocated to productive projects – especially industry – declined during the 1990s, making little contribution to the growth of factor productivity in LDCs.

Net private capital flows to LDCs declined from \$1.9 billion in 1992 to \$1.3 billion in 1998. Net FDI flows typically exceed net total private flows, net debt flows are negative, while net portfolio flows averaged only \$24 million annually during 1992-98 (\$27 in 1988).¹⁷ There is heavy concentration of FDI flows to a small number of LDCs – notably the mining and energy sectors in Angola, Equatorial Guinea, Myanmar and Yemen. The only other LDC to attract significant volumes of net FDI flows during the 1990s were Cambodia, Lao People's Republic, Uganda and the United Republic of Tanzania.

Table 4.1. FDI inflows to LDCs, 1988-1999 (Millions of current dollars)

	LDCs	African LDCs	Asian LDCs
1988-1993 (Average)	1,361	822	499
1994	1,168	844	292
1995	2,001	1,641	316
1996	2,394	1,632	715
1997	2,524	1,772	679
1998	3,715	3,062	603
1999	4,527	3,798	657
1994-1999 (Average)	2,721	2,124	543

Source: UNCTAD, World Investment Report, Geneva, 2000.

In many LDCs, a number of industrial and infrastructural projects require rehabilitation. Weak performance of these projects has burdened LDCs with foreign debt and undermined the portfolio of domestic financial institutions. Viewed in this light, project rehabilitation in the industrial sector and financial sector restructuring are two sides of a coin.

Table 4.2. Inward FDI flows as per cent of gross fixed capital formation, 1988-1998

	LDCs	African LDC	Asian LDCs
1988-1993	6.3	6.5	5.8
1994	3.6	6.5	1.6
1995	5.3	12.0	1.3
1996	5.5	12.1	2.4
1997	5.3	11.8	2.2
1998	5.81	20.1	2.0

Source: UNCTAD, World Investment Report, Geneva, 2000.

Box 4.7. Domestic private sector finance in African LDCs

Private sector financial institutions have begun to play an important role in some LDCs. In Benin, the Bank of Africa Benin - majority private-owned and established in 1990 - had by 1999 become the largest bank in the country. It has created the country's first leasing company and is a shareholder in Benin's first private life insurance company. BOAB participates in financing restructuring and expansion of large-scale enterprises. It also has SME and micro credit programmes.

In Togo, ECO Bank Transnational is also a private sector initiative. It is the first locally-run regional bank holding company with subsidiaries in Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Nigeria. It provides a range of corporate and consumer banking services and has established a regional school of banking. It plans to open offices in all 16 of the Economic Community of West African States.

The Commonwealth Development Corporation has established a venture capital fund in the United Republic of Tanzania. However, there has been a serious shortage of potentially high-return projects. Mozambique's first country fund, MIRCO, was launched in September 1998 and is reportedly doing well following the very high GDP growth rates Mozambique has enjoyed during 1999 and 2000. In September 1998, a regional bourse was established at Abidjan providing a common stock exchange for Benin, Burkina Faso, Guinea Bissau, Mali, Niger, Togo and other West African francophone countries. This is also expected to stimulate private investor activity

Source: UNIDO, Financing of Private Enterprise Development In Africa, UNIDO, Vienna (1999)

While some state-owned consumer goods-oriented industrial units have been divested, there are problems in the disposal of major public-sector enterprises in the infrastructural, energy and industrial sectors. An attempt must be made to restore viability of such major projects.

Increasing financial resources to LDCs – through FDI, ODA, build-operate-transfer, debt cancellation and reversal of capital flight from Africa, combined with improved investment efficiency, would make an important contribution to building productive capacities for industrial growth and rehabilitation. Such resources could preferably be directed towards productive capacity building and linked to technology upgrading, learning and improving competitiveness.

ODA can also make a useful contribution to industrial development by promoting the development of capital markets. In the 1990s, several African countries established stock and bond markets that attracted both domestic and foreign investment support. ODA support for country and regional funds for the promotion of venture capital can play a useful role in this respect. Of great importance is also cooperation between more-advanced developing countries and LDCs. In this regard, cross-border stock market listings by developing country industrial companies is a fruitful way of attracting portfolio capital.¹⁸

G. Manufacturing, trade and market access

Many LDCs find that while domestic markets are increasingly penetrated by foreign competitors, their export growth has been restricted by their inability to comply with increasingly exacting quality standards. Relieving supply side constraints – especially those related to quality controls and marketing – is a precondition for benefiting from globalisation (Box 4.8).

New developed country initiatives to open up developed country markets to LDC exports – the ACP-EU Cotonou Agreement of 2000 (successor of the Lomé Convention), the Tokyo International Conference on African Development programme and the United States-African Growth and Opportunity Act - will have little impact unless LDC supply-side constraints are eased. This requires continuous upgrading of technological and scientific capacities by LDC exporters to meet increasingly stringent quality, health, safety, environmental and production process standards in developed country markets.

Box 4.8. Overcoming technical barriers to trade

Technical barriers to trade have become important impediments to LDC export growth. LDC exports are often excluded from world markets on grounds of non-compliance with quality standards. Quality accreditation bodies in LDCs are usually not recognized in developed countries. In co-operation with the International Standardization Organization and the International Accreditation Forum UNIDO has developed a programme that helps to establish international confidence in the capabilities of LDC accreditation bodies. The programme also provides technical support to such accreditation bodies. Enterprise is provided testing and metrology services to enable them to meet international product and process standards. Such assistance is often built into UNIDO's national integrated programmes for LDCs. Quality upgrading has been particularly effective in the fish processing industry of Ethiopia, Rwanda, Somalia, Uganda and the United Republic of Tanzania

Food manufacturing, textiles and leather are major export industries for many LDCs, but technical regulations and compliance procedures are becoming increasingly complicated and demanding in these industries, constraining LDC exports. Sustaining export growth in these markets will depend on the provision of support to firms and industry associations to ensure that they are aware of, and can comply with, international standards. Support is required for:

- Documentary accreditation requirements and procedures.
- Development of a databank on technical and other trade barriers.
- Assessment of technical barriers to trade and their development impact.
- Sub-sectoral and sectoral diagnosis of LDCs export-oriented industries.
- Needs identification for quality upgrading and compliance with international standards.
- Establishment of standardization institutes, testing laboratories and conformity assessment systems.
- Development of a benchmarking framework.
- Process restructuring at enterprise level.
- Introduction of cleaner production and environmental management systems, especially at the enterprise level.

Such measures can facilitate trade by increasing the responsiveness of LDC enterprises to changing world demand and import regulatory regimes. The resources needed to boost domestic capabilities are likely to be huge and LDCs themselves do not possess the financial means for tackling this problem effectively. This support could come either in the form of ODA with a large technical co-operation component, UNIDO technical cooperation, or from strategic alliances with TNCs, including market access.

There are no automatic mechanisms in the market system to ensure that gains from trade are equitably distributed. As far as LDCs are concerned, trade liberalization has not led to a reduction of market concentration or an improvement in the bargaining position of LDC exporters. Export success is built on success of the domestic market. The export success of the Republic of Korea and Taiwan Province grew out of successful integration of domestic demand and export-oriented industrialization strategies.¹⁹ As trade barriers have come down and powerful transnationals have penetrated their markets, LDC firms have found it increasingly difficult to develop viable export sectors, other than those based on primary commodities. Liberalization has thus doubly disadvantaged the LDC producers. They cannot penetrate world markets because of their inability to comply with standardization and quality requirements and they are grappling with giant TNCs on their home terrain.

Moreover, the low-cost advantage that LDCs traditionally enjoyed is also being rapidly eroded as both labour and natural resource components of production even in standardized technology-based industries, such as food manufacturing and textiles, are reduced. Increasing

labour productivity and technological capabilities are prerequisites for building export competitiveness which, in turn, will contribute to poverty alleviation.

The experience of Bangladesh shows how spectacular export growth can coexist with growing poverty for several decades – the workers producing Bangladeshi clothing exports are the poorest paid in South Asia, where average wages are lower than perhaps anywhere else in the world (Box 4.9). The Bangladesh example also shows that sustainable export growth depends on rising labour productivity and technological capacity. Continuing with a low wage, low-productivity strategy is no longer a viable option for Bangladesh's clothing manufactures.

Box 4.9. Bangladesh Apparels: The challenges of free trade²⁰

The ATC ensures the phasing out of quotas in textiles trade by the end of 2004. Most analysts believe that the distribution of gains from this act of trade liberalization is likely to be skewed. It is feared that low-cost suppliers, such as Bangladesh, with small economies and a limited product range may be squeezed out by China, India and Thailand. Moreover, quota hoppers who came to Bangladesh may now leave as the country's quota advantage disappears.

Bangladesh's clothing industry has been spectacularly successful. Between 1970 and 1997, clothing exports grew at an outstanding rate of 28 per cent per annum – one of the highest growth rates for any industry, anywhere, and at any time in the world. The clothing industry now accounts for 21 per cent of manufacturing investment, 24 per cent of manufacturing gross profits and 30 per cent of manufacturing employment in Bangladesh.

But productivity is low and the product range limited to T-shirts, shirts, pyjamas, shorts, women's and children's wear. The textile (spinning and weaving) industry is very weak. Dyeing and finishing facilities are highly inadequate – although the knitting sector has shown improvement contributing to higher local value addition. Eighty per cent of the demand for yarn is met by imports. This is expected to rise to about 90 per cent by 2005. Current import dependence on fabrics is also around 85 per cent and is projected to increase.

The quota phase out will affect 31 items currently exported to the United States and 9 to Canada accounting for 60 per cent of clothing export earnings. China, India and Thailand currently export grey cloth to the United States – they will become Bangladesh's chief competitors in a quota-free world. Tightening rules of origin in the EU indicate that Bangladesh's preferential (zero rated) access to the EU is also unlikely to continue in the long run. Again there is no dearth of competition.

Since most of the products Bangladesh exports will remain subject to quotas till 2005, there is time for preparation. Moreover, Bangladesh is expected to retain her unit (labour) cost advantage over her main competitors, well into the future. But low wages means low productivity. Value added in Bangladesh's clothing is much lower than that in competitor countries. In 1998 it was only about 25 per cent of the gross value of exports.

Bangladesh needs substantial investment to upgrade its textile industry (the taka is depreciating at an annual average rate of about 5 per cent). The low-skilled export strategy pursued since 1980 is clearly no longer feasible. The threshold condition for maintaining competitiveness is technological capability building of the clothing sector labour force. International support and domestic policy orientation for technological capability building is vitally important for sustaining Bangladesh's success in the clothing industry – and for reducing poverty because the clothing industry employs some of the lowest paid workers of the world, most of them women. The Bangladesh clothing industry provides a classic illustration of the theory of "immiserising" growth. If growth is to be sustainable, both wages and productivity must rise rapidly in this sector.

LDCs trade strategy must focus on supply-side constraints that limit their ability to benefit from globalisation. Integrating the most successful LDC firms in world market structures is not enough, for there is a danger that this will create an enclave in the LDC economy from which the majority of the population will either be excluded or will provide labour services to it at very low wages. This type of "immiserising" trade growth will not relieve system-wide poverty, as it will not contribute significantly to human capacity building throughout the economy.

A different export strategy was developed by Mauritius through the formulation of a new competitiveness strategy (Box 4.10). This new strategy places increased emphasis on upgrading technology, skills, productivity, institutions, quality management and infrastructure. The strategy

provides an illustration of strategic adjustment to changing internal and external competitive conditions.

Box 4.10. A new competitiveness strategy in Mauritius

At independence in the mid-1960s, Mauritius was a poor country with dualistic economy consisting of a high productivity sugar plantation sector and a low productivity subsistence agricultural sector. There was little industry or services in this small, island economy of 1.2 million people (1997). Over the last three decades, however, Mauritius achieved an enviable developmental transformation to become a significant exporter of manufactures. Much of its industrial success is due to the entry of export-oriented foreign investment (\$ 22 million per year during the 1980s), particularly in textiles and garments. Mauritius was one of the earliest developing economies to initiate an export processing zone programme (EPZ) in 1970 and provide an outward-oriented development strategy, attractive investment incentives, political and macroeconomic stability, preferential market access to the EU and US markets, and cheap, bilingual labour. By early 1990s, there were 480 EPZ enterprises in Mauritius employing 81,048 persons. The country's manufactured exports grew at 14.5 per cent per year during 1980-97 and reached \$ 1.2 billion by 1997. It built up significant base of export-related skills, information and institutions, far ahead of neighbouring African countries and, with a per capita GNP of \$ 3,800 (1997), was seen as a candidate for second-tier newly industrialising economy (NIE) status in the 21st century.

In time, however, this early export success was subject to structural constraints. Exports fell to \$18million per year in the 1990s. In the late 1980s and early 1990s, a significant erosion took place in the country's locational advantages. In particular: (a) labour costs had risen significantly, labour productivity declined, and absenteeism rates increased; (b) a threat of the gradual elimination of preferential access to the European and US markets with the expiry of the Lomé Agreement and the Multi-Fibre Agreement for textiles; (c) residual bureaucratic procedures (particularly on FDI approvals and work permits for expatriate staff) were a barrier to more inward-investment; (d) inflation had begun to increase and with it came relatively high real interest rates and real exchange appreciation. Intense competition from new garments entrants (such as Sri Lanka, Vietnam and Bangladesh) prompted an evaluation of its competitiveness position and policies. In this vein, with external technical assistance, Mauritius undertook a study and formulated a competitiveness strategy for the 21st century. The principal elements of the new Mauritius competitiveness strategy, (1998-99 National Budget) are as follows:

- To upgrade the quality and technology of textiles and garments (its dominant export) and to develop new export niches in printing and publishing; electronics assembly; IT services; consultancy services and off-shore financial services.
- To establish a Mauritius Competitiveness and Productivity Council, with private sector participation, to take charge of all issues related to designing and implementing competitiveness strategy.
- To create a new specialised agency (a Board of Investment) for an aggressive investment promotion drive which emphasises targeting selected activities and investors, cuts approval times for foreign investors and provides high quality post-approval investor services.
- To strengthen the export drive by increasing the marketing budget of the main trade promotion organisation (MEDIA); to reduce bureaucratic procedures for exporters; and more aggressive exchange rate depreciation where required.
- To improve human resources by creating a Mauritius Institute for Technology to train tertiary-level technical manpower for new export industries and greater enterprise training via tax incentives and new worker training programmes.
- To encourage technological activity by a public awareness campaign on productivity and quality management, tax incentives for R&D and an increase in the operational budget of the main SME extension services organisation (SMIDO).
- To improve EPZ infrastructure by a feasibility study for a national shipping line, liberalisation of overseas air cargo and liberalisation of overseas telephone services.

Source: S. Lall and G. Wignaraja (1998), Mauritius: Dynamising Export Competitiveness, London: Commonwealth Secretariat..

H. Environmental protection

Sustainable development requires that environmental issues form an integrated part of industrial policy design. Environmental degradation in the form of desertification, deforestation and reduction in biodiversity is taking place at a rapid pace in many LDCs, deepening poverty and creating risk of human disaster. Industrial pollution is less of a problem but there is little room for complacency. Cleaner production technologies, effective waste management systems and energy conservation are central to a sustainable industrial strategy (Box 4.11).

An important environmental threat arises from the growth of poverty. The poor are first to adopt extensive farming methods and this accelerates the pace of desertification and deforestation. This also has an adverse impact on biodiversity. Similarly, appalling living conditions prevail in urban slums of LDCs leading to increasing risks of water contamination, air pollution and disease.

Prevailing environmental degradation in LDCs is not in the interest of the world community as is clearly recognized under the Global Environmental Facility (GEF). Assistance could be provided for fighting poverty in LDCs as a means for preventing environmental depletion.

Two initiatives are of particular importance:

- The need to rapidly expand non-farm employment in the countryside to reduce the pressure on land, increase the income of the poor and strengthen rural agro-industrial linkages. This will reduce the incentive for deforestation and, thus, preserve biodiversity.
- The provision of efficient micro enterprise networks in urban areas can enhance income and employment opportunities of slum dwellers, thereby improving their living conditions while reducing environmental depletion.

Since rapid industrial development requires the establishment of many new enterprises in LDCs there are opportunities for introduction of environmentally-sound production technologies. Experience shows that switching from traditional to clean technologies is strongly resisted by many influential pressure groups and is, in many cases, relatively expensive and, therefore, not affordable to LDCs. While an increasing range of clean production technologies are available on an "off-the-shelf" basis, process innovation is clearly important to promote environmentally-sound practices in LDC manufacturing.

Several initiatives have been taken to provide financial support for environmentally sound technologies (ESTs). Agenda 21, for example, identifies mechanisms for financing ESTs within the context of the climate change and Biodiversity Preservation Conservation. GEF funds are available for financing the use of ESTs in projects and for national institutional capability building. Actual transfer of resources to finance ESTs in LDCs has, however, been very meagre.

UNIDO- and UNEP-financed Clean Production Centres have enabled the United Republic of Tanzania to introduce cleaner production assessment and production in several firms. Environmental management systems have also been established in Ethiopia and Zambia.

Box 4.11. Initiatives in environmental protection

UNIDO has a wide and diverse range of services to offer with regard to initiatives in environmental protection. Their focus is on new support tools for the development of Cleaner Production Systems and integrating these systems into enterprise upgrading programmes and government policies. Assistance is also provided for the establishment of Cleaner Production Centres and projects related to water purification and climate change. Cleaner production centres have been established by UNIDO in Ethiopia, Mozambique and United Republic of Tanzania. A regional programme for African industry to establish capacity building for clean development mechanisms has been developed. UNIDO has also participated with UNDP and the GEF in the establishment of renewable energy projects.

UNIDO is developing a system to enable LDC manufacturing exporting enterprises to meet environmental related requirements. In 2001 a project will be launched to build capacity in support institutions for the private sector to provide a comprehensive set of services to exporting enterprises to meet environmental related requirements in global markets. The new approach will target the textile and leather sectors of Bangladesh (and three other developing countries) initially. The results will be presented at the Rio plus Ten Conference to be held in South Africa in June 2002. UNIDO will assist LDCs in preparing national position papers for this important Conference.

In the area of waste management UNIDO has undertaken important projects for removal of barriers to abate global mercurial pollution from artisanal gold mining in Lao People's Democratic Republic, Sudan and the United Republic of Tanzania. Several LDCs are also benefiting from programmes for the elimination of methyl bromide in Africa. GEF finance has further enabled support to the development of national environmental policy frameworks in West African LDCs.

Under the Montreal Protocol at the end of 2000 UNIDO was implementing 654 projects at a value of approximately \$220 million. This will lead to a phase out of 28,000 ozone depletion potential. Under the Kyoto Protocol, UNIDO is involved in providing assistance for capacity building in relation to climatic change.

I. Energy development

An increase in the consumption of energy, especially electricity, is inevitable in LDCs in order to alleviate poverty (Box 4. 12). Four areas in particular can be identified where access to energy is crucial for development:

- Education – electrical lighting is required for the students to work effectively; similarly electricity is necessary for access to radio, television and the internet
- Health - electricity is required for the efficient operation of health clinics, with adequate minimum being lighting and refrigeration for vaccines
- Communications - there is growing concern that without access to electricity there can be no telephone or ICT connections; bridging the “digital” divide also requires bridging of the “electricity” divide between countries.
- Industry itself needs reliable energy supply.

Box 4.12. Recommendations of High-Level Meeting on LDC Energy: March 2001

Access to energy:

- Introduce development mechanisms to link ODA and national public funding to raise incomes of the poor so as to create an environment attractive for investment;
- Invite LDC governments to assign higher priority to the energy sector;
- Support large-scale initiatives in selected LDCs for an integrated rural development programme, and identify a number of LDCs that can draft rural development programmes with energy components;
- Establish regional/sub-regional/national pilot programmes promoting decentralized energy generation;
- Promote cooperative programmes between LDCs and donors for the local assembly/manufacture of renewable energy equipment, including private sector involvement; and
- Identify and formulate projects that could be funded by the GEF and mobilize additional cost-sharing resources. Rational use of energy:
- Establish a network of regional/sub-regional centres for energy efficiency that would make use of existing capacities and mechanisms; establish regional/sub-regional/national pilot programmes promoting Energy Service Companies particularly emphasizing private sector involvement; and identify and formulate projects eligible for GEF funding and mobilization of the required additional cost-sharing resources.

Financing:

Identify preconditions for attracting investment in the energy sector; support investments in energy efficiency as a cost-effective solution; promote stable institutional and regulatory frameworks; assist in the development of possible mechanisms (such as a institutional and regulatory frameworks); assist in the development of possible mechanisms (such as a carbon credit system of fiscal measures) to attract investors, bundle small-scale projects, and promote investment funds and micro-credit schemes; support relevant training and capacity building; assist in the development of plans for investment strategies; and conduct feasibility studies for national/regional projects.

LDCs and hydrocarbons:

- Organization of a conference on the development of strategies to protect against oil price fluctuations, such as risk management strategies;
- The launch of an African training programme on hydrocarbons trade, risk management and finance;
- A focus on the critical role of efficient and appropriate pricing policies in improving energy efficiency;
- The launch of natural gas exploration and development initiatives for LDCs as proposed by the UN Secretary-General;
- A technical cooperation project to assist LDCs and sub-regional organization to draw effective policies and strategies to encourage regional cooperation for cross-border energy supply;
- Further consideration of specific deliverables for landlocked LDCs and corridors to those LDCs;
- Support for the establishment of strategic petrol storage facilities in landlocked LDCs, including encouragement to the private sector to be actively involved in this initiative; and
- Strengthening of institutional capacities in the hydrocarbon sector through comprehensive training programmes.

Source: UNIDO (2001): High-Level Meeting on Energy, Vienna, 14-16 March 2001.

Historically there has been a direct positive correlation between increases in energy consumption *per capita* and increases in GDP. Only after a certain level is reached a de-linkage between energy and economic growth can be observed. However, the key problem with regard to the accessibility to energy is cost. In countries with large rural populations living on one or two dollars a day it is clear that any commercial energy is unaffordable. As a consequence one

billion people in the industrialized countries account for around 60 per cent of world energy consumption while five billion people in the developing countries consume 40 per cent.

It is therefore inevitable that new sustainable energy sources be developed. One important aspect of improving the access to energy for LDCs is therefore increasing the proportion of domestic fuels and utilizing local resources for the introduction of renewable energy technologies in the form of solar energy, wind energy, biomass energy and small hydro power. These technologies have two basic advantages: a) they are environmentally friendly and sustainable and b) security of supply is in the hands of the local community. The associated cost, however, is a major issue in renewable energy development and application.

A related issue is the rational use of energy. At the global level only some 37 per cent of primary energy is converted to useful energy. UNIDO's industrial energy audits in developing countries have revealed that potential energy savings of up to 20 per cent can be achieved by simple "housekeeping" measures in the form of better operating procedures and maintenance. Comprehensive upgrading, or rehabilitation of plants and the introduction of new processes and technologies can improve energy efficiency by as much as 50 per cent while also improving quality and cutting other costs. An example of modern technology that dramatically reduces energy consumption is circulating fluidised bed combustion boilers. These boilers can reach efficiencies of over 90 per cent compared with the 60-65 per cent of a typical industrial boiler.

The efficient use of energy can be promoted by appropriate policies. The low LDC's consumer awareness of the benefits of energy efficient technologies and practices can be overcome by awareness campaigns. For such campaigns to be effective, they have to be accompanied by fiscal measures that provide financial incentives for efficient use of energy.

J. Regional cooperation

LDCs can benefit significantly from participation in regional integration schemes and from positive "neighbourhood effects". This spillover influence partly explains the differential in performance between Asian and African LDCs. There were no Koreas, Taiwans or Malaysias in Africa and although Africa has 11 regional groupings they cannot be compared to ASEAN, APEC or AFTA. The weak performance of "lead economies" – Egypt, Nigeria and South Africa – created a regional vacuum and long-term success stories, such as Botswana and Mauritius, were too small to have any regional impact.

This underlines the fact that LDCs can benefit from regional integration schemes only if major developing countries within them are consistently sound economic performers. On the other hand, the relative weakness of the SAARC illustrates that the presence of a major country makes equitable distribution of costs and benefits difficult to sustain over the long run and LDCs (Bangladesh, Bhutan, Maldives, Nepal) are unlikely to gain significantly from participation in such an arrangement.

LDCs participation in regional arrangements allows enterprises to enjoy economies of scale and scope and to invest more ambitiously than a narrow domestic market would otherwise permit including investment in infrastructure. This is particularly important for increasing applications of ICTs since this sector's growth in LDCs is crucially restricted by limited usage. Providing continuing training to ICT technical personnel (particularly in software development)

is becoming increasingly expensive and is profitable only if demand growth for services keeps pace with supply.

Moreover, financing major investments is likely to be relatively easier in a regional context. Thus, while establishing a bourse, a venture capital company or a mutual close-ended fund may not be feasible in an LDC, participation in a regional arrangement may give LDC firms and financial institutions access to capital markets. Foreign investment is also likely to be more readily available in such circumstances.

Renewed interest in regional integration – especially in Africa – reflects recognition of the fact that the globalizing world is also a regionalizing world and that trade and financial liberalization entail a harmonization of fiscal, monetary, industrial, labour and enterprise-specific (meso) policies at the regional level.

Some observers argue that welfare gains to LDCs from regional and global trade liberalization are small.²¹ Regional arrangements are now seen as growth-stimulating – and not trade-creating – mechanisms and emphasis is placed on policy harmonization and unification. Regional co-operation fosters policy coordination, information dissemination and the establishment of a policy monitoring institutional infrastructure for enhancing the competitiveness and productivity of enterprises (Box 4.13).

Box 4.13. Institution building at regional level – Eastern and Southern African Leather Industries Association (ESALIA)

The establishment of the Eastern and Southern Africa Leather Industries Association (ESALIA) is an important success story. It brings together leather firms and associations in Ethiopia, Kenya, Malawi, Namibia, Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. UNIDO has been involved in institutional support and product upgrading programmes in these countries. ESALIA seeks to promote co-operation for technology upgrading, training, market research and quality control. Expansion of footwear and leather manufactures exports from several African LDCs has been facilitated by ESALIA.

K. Concluding observations

This chapter has emphasized the importance of policies, strategies, programmes and measures for building productive capacities for industry in LDCs in the following areas:

- Industrial governance – strategies and policies
- Institutional infrastructure and public-private partnerships
- Entrepreneurship, enterprise development and the role of SMEs
- Agro-industrial development
- Technological upgrading and learning
- Investment promotion
- Industrial trade and market access
- Standardization and quality control
- Energy development
- Environmental protection
- Regional cooperation

The above priority areas for the development of productive capacities of LDCs constitute an important opportunity for the implementation of various commitments of the Draft Programme of Action for the LDCs for the Decade 2001-2010. They are particularly but not exclusively relevant to Commitment 4 on building productive capacities, and Commitment 5 on the role of trade in development, enabling LDCs to benefit from the process of globalisation.

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- 1 Walzer, 1997.
 - 2 This experience is discussed in “Multi-Purpose Village Workshop Guidelines for Implementation”, UNIDO, Vienna 1999.
 - 3 EC 2000. p. 9.
 - 4 Breschi 2000, pp. 390-407.
 - 5 Nelson 1987.
 - 6 Lall and Teubal 1998, pp. 1371–1374.
 - 7 Bell and Albo 1999.
 - 8 Stevens 1999.
 - 9 Stiglitz 1996.
 - 10 Lall 2000b, p. 24.
 - 11 UNCTAD 2000, pp.50-57.
 - 12 As defined by the World Bank 2000b.
 - 13 UNCTAD 2000, pp. 65-66.
 - 14 UNCTAD 2000 p. 54.
 - 15 World Bank 1998.
 - 16 Azam et al., 1999.
 - 17 UNCTAD, 2000 (b)
 - 18 UNIDO, 1997
 - 19 Wade, 1990.
 - 20 UNCTAD, Trade, Sustainable Development and Gender, Geneva, 1999, pp. 197-232.
R. Wade (1990) *Governing the Market*, London, Macmillan, and D. Rodrik (1997) *Has Globalization gone Too Far?* NLESR, Washington.
 - 21 Dani Rodrik calls this ‘the dirty little secret’ which trade theory seeks to hide, 1997.

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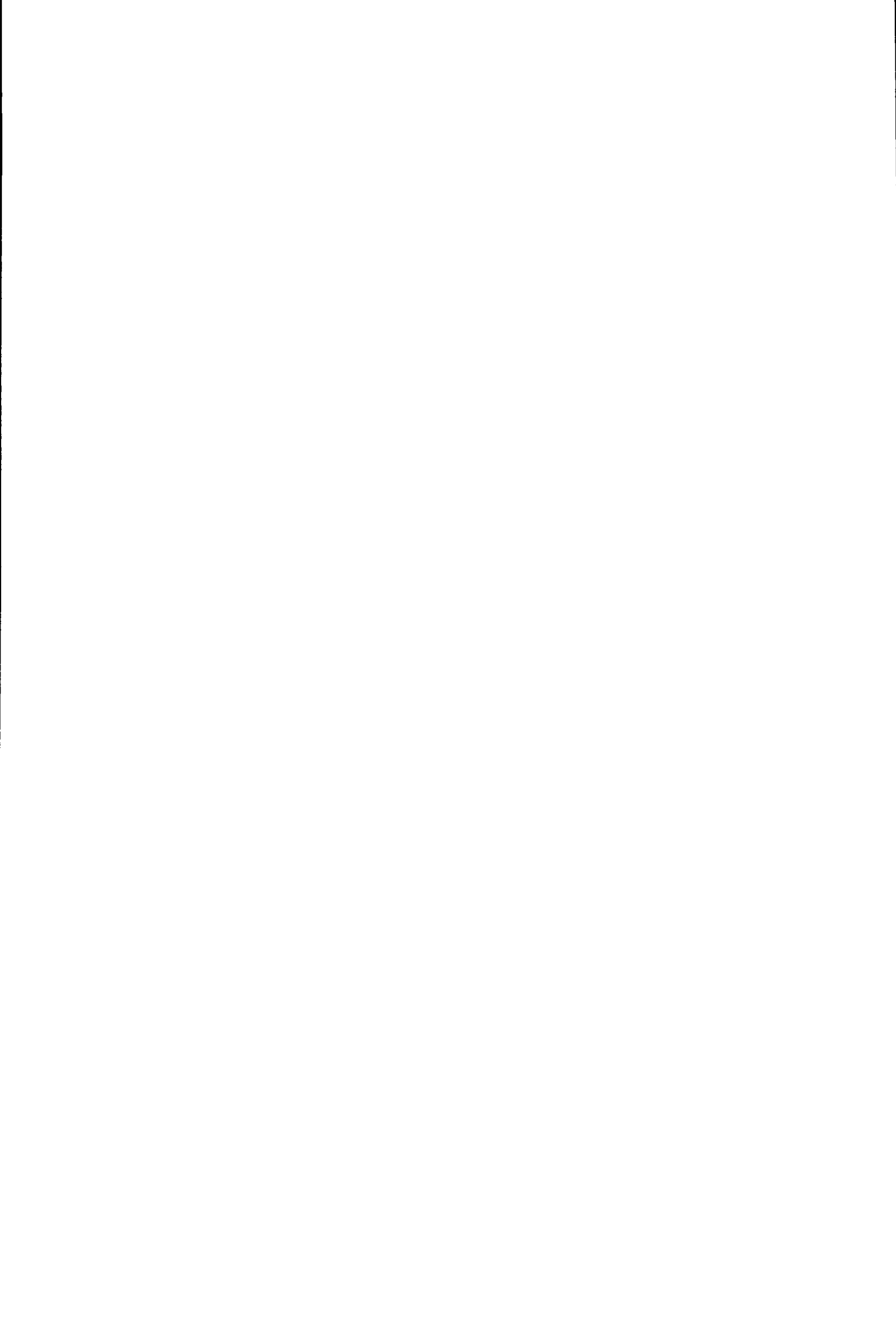
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