TECHNOLOGICAL TRANSFORMATION IN THE THIRD WORLD: VOLUME I

Asia

Edited by
Surendra J. Patel

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TECHNOLOGY

Volume 35

TECHNOLOGICAL TRANSFORMATION IN THE THIRD WORLD: VOLUME I

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com

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SURENDRA J. PATEL

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published in 1993 by Avebury

This edition first published in 2018
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
711 Third Avenue, New York, NY 10017

Routledge is an imprint of the Taylor & Francis Group, an informa business

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-138-50336-6 (Set)
ISBN: 978-1-351-06690-7 (Set) (ebk)
ISBN: 978-0-8153-6300-2 (Volume 35) (hbk)
ISBN: 978-1-351-11007-5 (Volume 35) (ebk)

Publisher's Note
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Technological Transformation in the Third World

Volume I: Asia

General Editor
SURENDRA J. PATEL
UNU/WIDER

A project of the
World Institute for Development Economics Research (UNU/WIDER)
Helsinki, Finland
and the
Institute for New Technologies (UNU/INTECH)
Maastricht, The Netherlands
of the
United Nations University

Avebury
Aldershot · Brookfield USA · Hong Kong · Singapore · Sydney

Published by
Avebury
Ashgate Publishing Limited
Gower House
Croft Road
Aldershot
Hants GU11 3HR
England

Ashgate Publishing Company
Old Post Road
Brookfield
Vermont 05036
USA

A CIP catalogue record for this book is available from the British Library

Typeset by
Anne Ruohonen and Liisa Roponen
UNU/WIDER

ISBN 1 85628 469 7
(Four-volume set ISBN 1 85628 473 5)

Printed and Bound in Great Britain by
Athenaeum Press Ltd., Newcastle upon Tyne.

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Foreword

Lal Jayawardena and Charles Cooper

The papers which are presented in this series of volumes, result from a major research project carried out, under the leadership of Dr. Surendra J. Patel, at the World Institute for Development Economics Research of the United Nations University (UNU/WIDER) in Helsinki. Dr. Surendra J. Patel had been for many years Head of the Technology Division at UNCTAD.

Whilst Dr. Patel's project was in progress, the United Nations University and the Government of the Netherlands reached an agreement to set up a new institute at Maastricht in the Netherlands, to carry out policy research on the economic and social impacts and implications of new technologies, especially in the developing countries. The new institute is the UNU Institute for New Technologies (UNU/INTECH). It is a sister institute to UNU/WIDER, within the UNU system.

Given the mandate of UNU/INTECH, it was obvious to us, as Directors of the Institutes, that Dr. Patel's project should become a joint undertaking. That is why the books in this series are published under the names of both UNU/WIDER and UNU/INTECH. We expect that there will be further joint undertakings in the future.

Dr. Patel focused the country studies, on which the project is based, towards 'technological transformation' within national economies. This reflected his own perceptions, formed by his experience at UNCTAD, that technological change (and policies to promote it) are given too little

attention by policy makers concerned with economic development. Experience in some of the Newly Industrializing Countries (NICs) strongly suggested to some that technological policies played an important part in their success, especially in the rapid and sustained increase in factor productivities on which that success was based. Others, who accept that factor productivity growth has made significant contributions to economic growth, both directly and through sustaining international competitiveness, are more doubtful about the role of policy in the process. Dr. Patel's project seeks to illuminate these issues. From the beginning it was obvious that the studies had to extend beyond the NICs to include other countries where the emphasis on technology policy was either less marked or different in orientation.

It is inherently very difficult to conclude the arguments between those who see technology policy as instrumental in technological change, and those who are sceptical about state intervention in this field. At the centre of the debate is the claim that, in the countries where productivity growth has been important in economic development, technological change would have been as, or even more rapid if there had been no policy interventions. The difficulty is, of course, that this is a counterfactual claim, which is by its nature impossible to prove or to disprove in any particular case. Nevertheless, it is possible that comparative studies can help to inform our judgements on this important matter, even though they do not completely resolve the basic methodological difficulty. The strength and interest of Dr. Patel's project is that it has this internationally comparative orientation. It will be for his readers to judge the evidence, which he and his distinguished colleagues have assembled.

Lal Jayawardena
Director
UNU/WIDER

Charles Cooper
Director
UNU/INTECH

Preface

Surendra J. Patel

The thirty years since the end of the World War II have been the golden age of political liberation, economic growth and technological progress. Tidal waves of independence movements swept the colonies and dependencies. Empires much larger than any that existed in the past, crumbled like sand-castles in a matter of only a few short years. New and independent nation states were born. The world political map, altered beyond recognition, was completely redrawn.

Meanwhile, the global economy grew at an unprecedented pace. Its total output more than quadrupled. Scientific discoveries piled on one another. The process of technological transformation was swift. New nations adopted processes and techniques that had only recently been invented. Hope spread like wild fire - in the spirit of Shelly's immortal lyric 'Prometheus Unbound' - where man: 'tortured to his will iron and gold, the slaves and signs of power...' But the extravagant visions and promises of that era were smothered in a series of crises beginning in the mid-1970s.[1]

I The golden age of south's development

Concern with contemporary crises has completely overshadowed the real advances achieved in the 35 years since 1950.[2] The overall GDP of the

third world has increased some six times, and per capita GDP 2.5 times, since 1950. Its industrial output is now 11 times higher than in the 1950s.

Technology embodying inputs in these countries have expanded even more impressively. For instance, annual real gross capital formation is now 15 times higher. Enrolment in the third level of learning at universities and institutes of higher education, have simply exploded - rising nearly 25 fold. Educational infrastructure, the foundation for sustained development in the future, has been laid with great effort and sacrifice.

Social advance, particularly in health, was simply spectacular. Infant mortality rates fell from 200 per thousand to between 30 to 70. Death rates declined from 25-30 to only 10-15. And life expectancy rose from below 40 years to about 65. With a spectacular sprint, the south had within less than 40 years caught up with the north of the 1960s.

The average annual rates of growth in these strategic areas, sustained for 35 years since 1950, were impressive - some 5.5 per cent for GDP, 7.5 per cent for industrial output, 8.4 per cent for capital formation, and 10 per cent for third level education. They were much higher than during comparable periods in the technological transformation of the north. Moreover, they were sustained long enough to create a highly visible effect.[3]

Consequent structural changes in the third world were profound. The share of agricultural output in GDP has fallen from about one third to one sixth. Conversely, that of industry has risen from about one sixth to about one third. Industry related services have expanded their share parallel to that of industry.

Shares of the technology embodying inputs have risen much more. Capital formation has increased from 7 per cent of GDP to over 25 per cent in 1980 - generally above that in most countries of the north. Structures of exports and imports have also witnessed similar movements. The share of primary exports has fallen. The shares of producer goods in imports, and of manufactured goods in exports, have risen significantly. Output of capital and intermediate producer goods has expanded sharply.

In consequence, the structure of industrial output in the third world is beginning to resemble that of most developed countries in the inter-war period. The actual volume, however, is of course much lower. Half a dozen developing countries now supply over two thirds of all their capital goods requirements (physical technology) from domestic sources. Another dozen countries supply over two fifths. Availability of skilled manpower, and its quality, have risen very sharply.

Professor Kuznets, reflecting on the 22-year period between 1950 and 1972, was deeply impressed by the high per capita growth rates already achieved by the third world. He considered these growth rates 'quite high in the long term perspective of both less developed countries and the developed countries.'[4] With a touch of bewilderment, he then added in 1975:

> If growth rates in the per capita product of the LDCs over almost a quarter of a century were impressively high, one may ask why the reaction to them in the general flow of news about those countries, in the persistent concern about critical conditions with respect to supplies of economic goods, seems to ignore these growth achievements.

He wondered 'why no litanies of praise' were sung 'for these economic miracles'! Instead, there were only references to 'dangers of collapse in the third world.'

II The framework of approach

These vast changes have not been captured in the narrow confines of contemporary technology studies.[5] At least two reasons may have been instrumental for this. One, concern with technology issues is relatively recent in origin. Second, the literature on technology which has mushroomed over the last 15 years concentrated mainly on several micro facets. The issues covered by these studies were of course very important. They have helped advance our understanding of technological processes. But they overlooked the overall structural changes in a long term historical context.

In order to overcome this weakness, WIDER invited a group of experts to Helsinki in November 1985 to discuss the broad approach to be used in the study of technological transformation in the third world.[6] They discussed the proposals made by WIDER on a comprehensive long term programme of work of WIDER. This also included a detailed outline which was to serve as a guideline for the preparation of the individual country studies.[7] The outline was intended to assure a degree of uniformity in the preparation of the country studies, thereby facilitating a broad comparative assessment of the country experiences. A more detailed framework of our approach is given in the opening chapter of Volume V - *The Overview* of this series. Only a brief summary is therefore given here to facilitate an easier comprehension of the contents of individual country studies.

Following the expert meeting, WIDER initiated in 1985 in-depth studies of long term changes in the following 16 third world countries:

Asia:	Latin America:	Africa:	Europe:
Bangladesh	Brazil	Algeria	Yugoslavia
China (including Province of Taiwan)	Island of Puerto Rico	Angola	
India	Mexico	Nigeria	
Republic of Korea	Peru	Tanzania	
Sri Lanka	Venezuela	Zimbabwe	

In addition, four developed countries, Finland, Greece, Japan and the USSR were also included in the WIDER project since their technological transformation spanned the twentieth century.

It needs no emphasis that the 16 third world countries differ from one another in so many ways: for instance, in their resource endowment, climatic and soil conditions, degree of external vulnerability, size of their population, the level of development achieved, the rates of growth realized, the structure of their economies and in the policies, plans and priorities pursued by them. They are located in all the major continents.

In terms of countries, these 16 represent only a small minority of the 130 countries constituting the third world as a whole. But the small number of units is potentially misleading. In terms of their population and output, these 16 represent over 70 per cent of the third world total.

An analysis of such widely varying experiences could, it was hoped, help identify the main patterns of technological transformation which have emerged over the last 35 years. It could point to both the strengths and the weaknesses exhibited over this period. Such an effort could, it was hoped, help assess differences in the patterns of technological inputs and in the decision making process governing the acquisition, use, adaptation, diffusion, improvement and innovation of technologies. It could also improve our understanding of both the quantitative and qualitative implications of changes in several parameters which, as an ensemble, could be considered to constitute the process of technological transformation.

The full realization of the technological possibilities open to a country is governed by a number of factors. They are at once economic, social, political and cultural in character. Some are internal to the country while others are external in origin. In combination, they govern the pace of technological transformation and period over which this happens.

The WIDER project, it is hoped, would at least begin charting the trajectories along which the technological transformation in the third world might have proceeded. This is not to imply that such a dynamic process can be imprisoned in the strait-jacket of a rigid structure.[8] Freezing this process into the mould of a rigid definition would not therefore be very meaningful.

It should also be underlined that technological transformation is a process that is much wider in scope than is industrial development. It does include industrial development, but also includes many aspects of agricultural production, as well as development of infrastructure and services. Indeed, the entire economic system is involved in the process of transformation.

Its scope is also wider than that of economic growth,[9] or economic development - a term which has more recently begun to become the current coin.[10] Beyond the simple rate of economic growth, and beyond the rate of capital formation which is conventionally invoked for economic growth, technological transformation includes in particular the influence on growth of human capital formation and associated productivity increases, as well as the impact of major institutional, political, and social innovations on the productive system in general. These differences should not, however, be

pushed too far. Economic growth looks at the outputs, and technological transformation at the inputs: these are after all two sides of the same coin, the process of production.

It is only possible to chart aspects on which data are more readily available. They include a number of crucial points and widely recognized essential profiles. A list of these would certainly include:

- The rate of growth of GDP and per capita GDP
- Changes in the structure of production
- Changes in the structure of trade
- Domestic production of machinery and equipment
- Availability of advanced education
- Infant mortality rate
- Literacy rate
- Consumption of energy per capita

None of these indicators yield absolute targets to be aimed at. Technological transformation is a process - not as a finite objective which, once attained, loses its validity. Several elements of this process may be identified as landmarks, marking the changing terrain of the journey. Like any process, or passage through time, technological transformation too traverses several phases and sub-phases with overlapping interludes. Economic historians have always been fascinated by these. They have attempted to divide the process into its major components. These categorical classifications have too often provoked lively but diversionary controversies among contemporary scholars. Often the heat of this debate has had little relationship to its usefulness. Most schemes later proved too rigid for predictive purposes or policy formation.

Technological transformation is a process so recent in its arrival, so short in its duration, so meteoric in its pace; almost contagious in its spread to so many countries and continents. These countries each have their own specific domestic features. They have faced widely varying external environments, including the historical stock of technological innovations they could draw upon, and their ease of access to that stock. They have varied in the development of their own technological capabilities.

The experience of the 20 countries analysed under the WIDER project was reviewed at the WIDER Conference on Technological Transformation in the Third World, held in Helsinki from August 19 to 23, 1988.[11] A review of the drafts of the studies suggested that 13 of them together with an Overview should be published as a joint project of the two Institutes of the United Nations University: the World Institute for Development Economics Research (UNU/WIDER, Helsinki, Finland) and the newly established Institute for New Technologies (UNU/INTECH, Maastricht, The Netherlands). The studies were grouped into four volumes as follows:

I Asia
II Africa
III Latin America
IV Developed countries

A fifth volume, an Overview by Surendra J. Patel, will also be added to the series as a concluding contribution to the WIDER project.

These volumes owe a heavy debt to past contributions on the subject. This applies particularly to Volume V - the Overview. We have drawn freely upon the vast research effort which has gone into development economics, economic history, technology studies in general, and country studies in particular. The intellectual debt we owe to these contributions is simply enormous. If many of them are missing in the list of references, it is in no way meant to detract from our debt to them.

III Technological transformation: Volume I - Asia

The first volume in this series contains four studies on Asia: Bangladesh, India, Korea (Republic of) and Sri Lanka. The study on Bangladesh was written by Professor A.A. Abdullah and Dr Atiq Rahman of the Bangladesh Institute of Development Studies, Dhaka. Professor K.K. Subrahmanian of the Centre for Development Studies in Trivandrum has prepared the study on India. The experience of South Korea was examined by Professor Linsu Kim of the Graduate School of Business Administration of the Korea University, Seoul. Finally, the fourth study on Sri Lanka was prepared by Mr Wilfred S. Nanayakkara and Dr P.C. Rodrigo of the University of Colombo. It will be seen at once that the experience of the four countries differed from one another in very important respects.

I wish to thank all the authors of the studies and their colleagues whose scholarship and devoted labour have attempted the so far untried task of capturing the moving image of a complex dynamic process into a single short story. Theirs has been a difficult task. They have drawn attention to the inherent strengths which have been built up and the weaknesses which remain to be overcome. The lessons of their experiences will have to be distilled so that new and more appropriate strategies could be devised for the future.

The four country studies published under this volume reflect four different patterns of technological transformation. India stands out as the country with the second largest population in the world. It has admittedly made considerable progress on many fronts. But its overall development has been rather slow. In consequence it has indeed regressed in the world economy. At the other extreme is South Korea, which had a very low per capita income in the 1950s, but which registered a quantum leap in technological transformation within a short span of 30 years. A study of its experience led Professor Mikoto Usui in his study of Japan, included in

Volume IV in the series, to ask the most unexpected question: Why did it take Japan so long to complete its initial phase of transformation? In contrast, Bangladesh is the largest of the least developed countries which has yet to make a serious beginning towards its own transformation. The heritage of its past, weighing heavily on it, has constrained its progress in overcoming its structural weaknesses. In comparison, Sri Lanka displays a very different pattern. It is a small country, which had made remarkable progress in social advance (particularly in health and education), but its recent internal instability has held back a more decisive transformation of its economy.

IV Acknowledgements

A project like this is necessarily a collective venture. It is impossible to list all those who helped the process. But there are some who merit special mention for without their cooperation the project would have been neither initiated, nor completed.

I wish to thank Dr Lal Jayawardena, the Director of UNU/WIDER who encouraged me to initiate this project and helped towards the completion of the country studies. I am indebted to Professor Charles Cooper, the Director of the newly established Institute of New Technologies (UNU/INTECH), who assisted me in selecting the studies for publication.

It has been a pleasure to have the help of Ms Anne Ruohonen, who from the very outset of the project in 1985 has worked very closely with me to ensure the completion of this project. She has gone through several drafts of the country studies as they came in, and meticulously prepared the final print-ready manuscript. I owe special thanks to Ms Liisa Roponen who has with remarkable patience prepared and checked all the tables and charts in the text. In addition I wish to thank Ms Ann Halme and Ms Abby Johnson for their substantial contribution to the typing of the country studies.

Surendra J. Patel
General Editor
UNU/WIDER

Appendix

Lists of participants in UNU/WIDER meetings on Development and Technological Transformation in the Third World: Progress Achieved and Problems Faced

Planning Meeting, Helsinki 23-25 November 1985

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Notes

1. See Annual Reports by UNCTAD, United Nations and its Regional Commissions, and specialized agencies, the World Bank.
2. For details see Patel, Surendra J., 'In Tribute to the Golden Age of South's Development', in *World Development*, June-July 1992; 'The South Commission: Main Lines of its Action', Paper presented to the Commission in March 1988. See also the author's 'Age of the Third World', in *The Third World Quarterly*, January 1983, vol. 5, no. 3; 'L'age du Tiers Monde est Proche' in *Le Temps Strategique*, Geneva, no. 2, Automne 1982; and in Spanish in *Comercio Exterior*, Mexico, June 1983.
3. Paul Streeten called the post-war development process 'a spectacular, unprecedented, an unexpected success'. p. 11. The word 'unexpected' (Streeten) gives an insight into how development economists had rated the growth prospects for the third world - not very highly at all. The tone of the discussion was set as early as the 1951 Report of the first United Nations Expert Group (1951), *Measures for the Economic Development of Under-Developed Countries*, New York. In that report, the experts, including Prof. Arthur W. Lewis among them, had called for a minimum net investment equalling 20 per cent of the national income of these countries (one half of it to be financed mainly by the United States). Such huge investments, they concluded, might raise their national income by about '2.5 per cent'. The per capita

figure would have been only 1.25 per cent, since they had estimated population to grow at 1.25 per annum (p. 78). But in order to avoid giving too low a figure, and to add a touch of optimism, they simply rounded it upwards to 2 per cent!

The implicit incremental capital output ratio was 8 on a net basis, and possibly as high as 11 or 12 on a gross basis.

4. Kuznets, Simon (1975), *Aspects of Post-World War II Growth in Less Developed Countries*, Economic Growth Center, Yale University, Discussion Paper no. 234. See footnote 9 below for some details on the background to this query. See also Morawetz, David (1977), *Twenty-five Years of Economic Development, 1950 to 1975*, Baltimore, Md., Johns Hopkins University Press. Streeten, Paul and Associates (1981), *First Things First: Meeting Basic Human Needs in Developing Countries*, Oxford University Press, Maddison, Angus; (1982), *Phases of Capitalist Development*, Oxford University Press, New York.

   Professor Lewis, for example, had been earlier very sceptical about the capacity of the developing countries to grow at even 4 per cent, which he considered to be 'so difficult to obtain that it is really quite an ambitious target'. See Institute of Development Economics, *Economic Digest*, vol. 3, no. 4, Winter 1960, p. 3. But while receiving the Nobel prize in Economics in Stockholm in December 1979, he drew attention to the much higher growth rates which these countries had achieved. His tone changed. He concluded:

   > Some people were even more surprised by the performance of the LDCs. In 1950 these people were sceptical of the capacity of the LDCs to grow rapidly because of inappropriate attitudes, institutions or climates. The sun was thought to be too hot for hard work, or the people too spendthrift, the government too corrupt, the fertility rate too high, the religion too otherworldly, and so on. This kind of analysis has now almost completely disappeared from the literature... I think the LDCs have demonstrated beyond doubt their ability to use physical and human resources productively.

   See Lewis (1980), 'The slowing down of the Engine of Growth' (revised version) in the *American Economic Review*, vol. 70, no. 4, Sept. 1980, pp. 555-64.

5. WIDER (1985), 'Technological Transformation of the Third World: Progress Achieved and Problems Faced', WIDER/TT/1.2, pp. 1-3, unpublished project outline.
6. See Appendix for a list of the participants.
7. Op. cit. footnote 5, pp. 3-7, and Annex II 'An Indicative Outline for the Country Studies', pp. 9-22, including 9 table formats.
8. Like science, technology has many facets. In his extensive review in *Science and Progress* (no. 146, 1949) of Bernal's *The Social Function of Science*, Professor Dingle listed ten different ways in which Bernal

used the word *science*, or *scientific*, and demanded that Bernal define precisely what he meant by science. In response, Bernal cited Einstein and Black in support of his position, and stated that: 'With any concept so wide-ranging in time, connection and category, multiplicity of aspect and reference must be the rule. The words science and scientific have a number of different meanings according to the context in which they are used.' Bernal, J.D. (1965), *Science in History*, Penguin Books, p. 31. He had earlier already stated in his preface that 'Science throughout is taken in a very broad sense and nowhere do I attempt to cramp it into a definition... Science, in one aspect, is ordered technique; in another, it is rationalized mythology' (p. 3). He also noted that '...the real source of wealth lies no longer in raw materials, the labour force or machines, but in having a scientific, educated, technological manpower base. Education has become the real wealth of the new age.' (p. 17).

9. Kuznets, S.S. (1966), *Modern Economic Growth: Rate, Structure and Spread*, New Haven, Yale University Press. He defines modern economic growth as an *economic epoch*, a relatively longer period extending well over a century. It is characterized by the epochal innovation of 'the extended application of science to the problems of economic production' (p. 9). Some epochal innovations 'may be largely technological', he stated, but 'the exploitation of the potential of growth provided by them usually requires much social invention - changes in arrangements by which people are induced to co-operate and participate in economic activity.' (p. 5) What Kuznets calls 'social invention' may be more appropriately termed social inventions and innovations, or simply 'social technology' as has been done in our study. In this connection see also the end of footnote 7 above.
10. Following the works of Lewis, W.A. in 1950 and Kuznets, S.S. in 1960s, the early emphasis in development economics was on growth of output or GNP, which was not expected to be particularly high. In reality, there was indeed an impressive growth of GNP in the developing countries since 1950. But as this did not succeed in eradicating poverty and meeting basic needs of the vast majority of the population. Some scholars, mostly untrained in the intricacies of economic measurement, intensely unhappy at this outcome even argued for *dethroning* GNP, and called for a substitution of the phrase *economic growth* by *economic development*. In reality, however, all development was predicated upon accelerating *economic growth*, see Lewis, W.A. (May 1954), 'Economic Development with Unlimited Supplies of Labour', Manchester School of Economic and Social Studies, vol. 22, no. 2, pp. 139-91; Kuznets, S.S. *Modern Economic Growth*, op. cit.; Streeten, Paul and Associates *First Things First*, op. cit., pp. 8-22.
11. See Appendix for a list of the participants.

Bangladesh

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I Introduction

The usual description of Bangladesh as a backward and overwhelmingly agricultural country remains as true today as it was in 1972, the first year of independent Bangladesh, or indeed in 1947, the year Pakistan became independent. In the intervening period, the rise in per capita income has been slow and erratic, primarily determined by the fluctuations in the growth in output of the agricultural sector. While GDP growth rate has averaged less than three per cent per annum (1949-50 - 1985-86 average 2.88 per cent with the highest rate of 4.98 per cent per annum for 1960-61 - 1964-65), GDP per head of active population has grown at a much lower rate of less than one per cent (0.64) over the period 1949-50 - 1985-86 with negative growth over the fifties and a downswing over the early eighties (Table 11.1).

There have been some changes in the composition of output and employment, as we can see from Tables 1.1, 11.2 and 11.3. The contribution of the agricultural sector GDP has fallen from about two-thirds (64.6 per cent in the early 50's) to less than a half (47.9 per cent over 1980-81 - 1985-86), and that of both the manufacturing sector and services increased - the manufacturing sector increasing its contribution to about a tenth and services to more than a third of GDP. Agriculture naturally is the largest employer of the economically active population, but at least from 1961 on, employment has grown faster in non-agriculture than in agriculture (Table 1.1).[1]

TABLE 1.1

GROWTH OF EMPLOYMENT BY BROAD INDUSTRY GROUPS

Industry groups	Exponential growth rates (% per annum) 1961-74	1974-83/4
1 Agriculture, forestry and fishery	1.3	-0.3
2 Non-agriculture:	4.3	9.7
Manufacturing	1.8	7.5
Electricity, gas and water	-2.5	29.6
Construction	-7.5	24.5
Transport and communication	4.3	13.2
Finance and business services	14.7	11.1
Trade and services	2.4	14.6
Community and personal services	8.5	3.8

Source: Rahman, Atiq (1983), 'Development Strategies and Productivity in Bangladesh' BIDS Research Report no. 41, BIDS, Dhaka, October, p. 9, Table 3.

Note: For an explanation of the negative growth in employment in the agricultural sector, see Footnote 1. The declines in employment in electricity, gas and water and construction sectors can also be partly attributed to data deficiencies. But one can also note low employment in these sectors in the post-liberation Bangladesh - low employment caused by low activity in these sectors. The negative growth rates, therefore, have to be interpreted with caution as they do not show a secular decline in employment, but very much a transitory phenomenon due to the war of liberation. The higher rates of growth in employment in these two sectors over the next period partly show increased activities in these two sectors, as well as the fact that 1974 employment may have been abnormally low.

Both the poverty situation and relative income distribution worsened considerably over the early to the late seventies (Osmani and Rahman 1986), but in the early eighties these parameters have shown some improvements (Rahman et al. 1987). The absolute number of the poor increased from about 45 million in 1974 to about 64 million in 1982, and then declined to about 45 million in 1986 (Table 11.4). The Gini ratio of income distribution in rural Bangladesh similarly increased from 0.34 in 1973-74 to 0.42 in 1976-77 and then it also declined to about 0.34 in the mid-eighties. Such a reversal of the trends in the distribution of income and poverty undoubtedly raises questions about the reliability of the source material used (the Household Expenditure Survey, HES, Data of the Bangladesh Bureau of Statistics, GOB).[2] However, analysis of various poverty correlates such as real wages, landlessness, unemployment and demographic variables corroborate the improving trend in recent years, but these cannot justify the quantum improvement as indicated by the HES data (see Rahman et al. 1988).

Like the changes in the distribution of income and poverty levels, labour productivity (defined as value added per worker) also show some disconcerting changes (Table 1.2). Such dramatic shifts are probably at least partly to be attributed to data deficiencies. The negative productivity growth in industry in the post-liberation period may, however, reflect excessive employment in public sector enterprises, as well as the results of the loss of different levels of managerial skills due to the exodus of the West Pakistani community and the loss of technical skills through the exodus and incarceration of the Dihari community. Utilities may also be hiring and retaining labour for non-economic reasons. The drastic change in productivity trends in construction may reflect the increasing weight of certain labour-intensive construction activities - rural roads, rural primary health centres, as well as the substitution of certain labour-intensive process for capital-intensive ones, e.g. hand broken bricks for machine-ground clinkers.[3] This is partly corroborated by Rahman's finding that the capital value added ratio in construction fell from 10.18 in 1964-65 to 0.81 in 1976-77 (Rahman 1985, Table 6.3). It appears from this that over this period there was a general decline in the capital value added ratio in most sectors, though none as dramatic as in construction.

Of course, one should be cautious in interpreting the fall in capital value added ratio from 10.18 to 0.81 over the period 1964-77. The valuation of capital (at book value minus accounting depreciation) in a period of rapidly rising prices could lead to such a statistical decline in the ratio.[4] The point to consider is whether this decline implies a significant shift in capital and labour intensive processes where productivity, as noted by Rahman, arises to a large measure from the accounting of capital at book value, and therefore the fall in capital value added ratio reflects the use of more labour intensive operations at various stages of production.

Despite such qualification about the broad macro-parameters of productivity, Bangladesh presents a picture of stagnation, economic as well

as technological (accompanied by, one may add, political and cultural retrogression). In only two areas can one identify something approaching a technological 'transformation'. One is the consumption pattern of the urban rich. The number of radio sets, for example, increased from only seven thousand in 1947 to 587 thousand in 1985, television sets from seven in 1967 to 310 thousand (including 58 thousand coloured sets) in 1985. Consumption of electricity increased by about threefold over the ten year period beginning 1974-75. Telephone communication also improved; the number of subscribers increased from 90 thousand in 1979 to 151 thousand in 1985. While a digital system of telephone exchanges is being considered for introduction in the country, a countrywide direct dialling system and the microwave and satellite transmission allows the rich to communicate instantly not only with others within the country but also with about 80 countries around the world. Major international events can now be seen live via satellite. Video cassette recorders and video rental shops have proliferated, together with more traditional electronic appliances, and this has no doubt has some backward linkage in terms of local repair and maintenance capacities. The expansion of the manufacturing and finance sectors have also brought about a small 'computer boom'. The number of computers in the country up to 1975 probably did not exceed two - the ones at the then United Bank Ltd. and the Adamjee Group of Industries. Today there are around 50 Mainframe computers and a large number of small but powerful micro and mini computers, and again, local subsidiaries of the suppliers (primarily IBM) have acquired some, unfortunately still limited, repair and maintenance capabilities.

The other area in which there has been a degree of technical change that might qualify for the epithet 'transformation' is agriculture. According to estimates by Hossain (1984) who used official statistics on production, there had been a significant acceleration in the rate of growth of agricultural output after 1957-58, though the rate slowed down later in the late seventies and the early eighties. Boyce however, came up with higher growth rate estimates based on his 'corrected' estimates of production; corrected for the underestimation of the official statistics.[5]

This comparatively superior performance merits closer attention. However, before we proceed to a discussion of performance by sectors, we sketch in broad outlines the historical and structural roots of the overall stagnation of the economy.