CHOICE OF TECHNIQUE IN
THE INDONESIAN WEAVING INDUSTRY

by

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A Thesis Submitted for the Degree of Doctor of Philosophy in the Department of Economics, Research School of Pacific Studies, Australian National University

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There is much discussion of the role of the manufacturing sector in LDCs in providing productive employment opportunities for a rapidly growing labour force. In recent years there has been widespread dismay at the relatively poor record of labour absorption in many LDCs. One reason for this poor record, it is argued, is the adoption of 'inappropriate' industrial technology. According to this view, capital-intensive machinery produced in Western countries may not be suited to low-wage, capital-scarce LDCs.

Far less attention has been given to detailed industry case studies. This thesis is intended to provide an investigation of the situation in Indonesia, an example of a LDC with a developed industrial technology. The purpose of this chapter is to present the issues with reference to the Indonesian weaving industry. During the last decade the industry has undergone a rapid transformation; the small loom sector has declined and a modern capital-intensive mill sector has emerged. For several reasons the Indonesian weaving industry is well suited to a choice of technics study.

We argue that a proper analysis of the choice of technology in the industry requires a thorough understanding of the weaving industry in general, recent developments and the current structure of the Indonesian weaving industry in particular, the state of factor markets in the industry, and the nature of government policies. Our main findings are that, owing primarily to the existence of factor market segmentation, a wide range of weaving techniques is likely to remain for many years. We also conclude that it is economically rational for investors in the modern mill sector to adopt the most capital-intensive technology, given the factor prices they face. However, an alternative set of policies - where resources are priced at a level approximating their social opportunity cost and certain government policy reforms are effected - a less capital-
ABSTRACT

There is much discussion of the role of the manufacturing sector in LDCs in providing productive employment opportunities for a rapidly growing labour force. In recent years there has been widespread dismay at the relatively poor record of labour absorption in many LDCs. One reason for this poor record, it is argued, is the adoption of 'inappropriate' industrial technology. According to this view, capital-intensive machinery produced in western countries may not be suited to low-wage, capital-scarce LDCs.

Far less attention has been given to detailed industry case studies, which examine the technological options for LDCs in a given industry, the economic performance of available techniques, and the impact of alternative sets of factor prices and policy regimes on the selection of industrial technology. The purpose of this thesis is to examine these issues with reference to the Indonesian weaving industry. During the last decade the industry has undergone a rapid transformation; the hand loom sector has declined and a modern capital-intensive mill sector has emerged. For several reasons the Indonesian weaving industry is well suited to a choice of technique study.

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intensive loom emerges as the preferred technique. There is no reason to presume that this technique would not be adopted more extensively if the necessary reforms were introduced.
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If I am critical of government policy in parts of the thesis, I hope it is not seen as a personal reflection on these fine people.

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>v</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>viii</td>
</tr>
<tr>
<td>List of Tables</td>
<td>xiii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xvi</td>
</tr>
<tr>
<td>List of Plates</td>
<td>xvii</td>
</tr>
<tr>
<td>Glossary of Indonesian Terms</td>
<td>xviii</td>
</tr>
<tr>
<td>Glossary of Weaving Terms</td>
<td>xxii</td>
</tr>
</tbody>
</table>

## CHAPTER ONE: INTRODUCTION

1.1 The Object of the Study                                             1
1.2 The Approach of the Study                                           3
1.3 Outline of the Thesis                                               5

## CHAPTER TWO: INDUSTRIALISATION, EMPLOYMENT AND THE ROLE OF THE WEAVING INDUSTRY IN DEVELOPING COUNTRIES

2.1 Introduction                                                        7
2.2 Unemployment and Labour Utilisation in Indonesia                    7
2.3 Industrialisation and Employment                                    14
  2.3.1 General Observations                                            14
  2.3.2 Employment and the Weaving Industry                             18
2.4 The Role of the Weaving Industry in Developing Countries            21
  2.4.1 Japanese Industrialisation and the Weaving Industry, 1900-1955  21
  2.4.2 The Development of the Indian Weaving Industry After 1950       26
2.5 Implications for the Indonesian Weaving Industry                   36

## CHAPTER THREE: THE INDONESIAN WEAVING INDUSTRY BEFORE 1967

3.1 Introduction                                                        41
3.2 The Colonial Era and Early Independence, 1900-1949                  41
  3.2.1 Developments Before 1930                                        41
  3.2.2 The Depression and the Beginnings of Industrialisation          43
CHAPTER FIVE: GOVERNMENT POLICY AND THE INDONESIAN WEAVING INDUSTRY

5.1 Introduction
5.2 The Ideology of Intervention
5.3 The Nature of Intervention
5.4 The Indonesian Government's Industrial Policies
  5.4.1 Introduction
  5.4.2 The Impact of the Taxation System
  5.4.3 Labour Regulations
  5.4.4 Government Programs to Assist Small-Scale Industry
  5.4.5 Other Government Policies
5.5 Conclusion

APPENDIX 5.1 A Note on the Prohibition of Imported Second-Hand Textile Machinery
APPENDIX 5.2 The Economic Performance of Government Weaving Mills

CHAPTER SIX: CREDIT: A FRAGMENTED MARKET

6.1 Introduction
6.2 The Nature of Capital Markets in LDCs
6.3 An Overview of Credit Sources in Indonesia
  6.3.1 Foreign Credit Sources
  6.3.2 The State Banking Sector
  6.3.3 Private Banks
  6.3.4 The Unorganised Credit Market
  6.3.5 Financial Dualism?
  6.3.6 Credit Sources: Survey Findings
6.4 The Lending Operations of State Commercial Banks
  6.4.1 Pungli
  6.4.2 Appraisal Procedures
  6.4.3 Other Problems in Lending to Small Firms
  6.4.4 The Problems from the Banks' Perspective
6.5 Aspects of the Unorganised Credit Market
  6.5.1 Traders' Credit
  6.5.6 The Cashing of Post-dated Cheques
  6.5.3 Maakloon as a Form of Credit
6.6 Conclusion

APPENDIX 6.1 Maakloon Calculations

CHAPTER SEVEN: WAGES AND CONDITIONS OF EMPLOYMENT

7.1 Introduction

7.2 Inter-Technique Wage Differentials in the Indonesian Weaving Industry

7.2.1 The Magnitude of Inter-Technique Wage Differentials

7.2.2 Payments Systems and the Composition of Wages

7.2.3 Towards an Explanation of Inter-Technique Wage Differentials

7.2.4 Segmented Labour Markets and the Choice of Technique

7.3 Wages and Working Conditions in the Hand Loom Sector

7.3.1 The Range of Hand Loom Wages

7.3.2 How Low are Hand Loom Wages?

7.3.3 Wage Levels and the Future of Hand Loom Weaving

7.4 Conclusion

CHAPTER EIGHT: THE CHOICE OF TECHNIQUE: SOME METHODOLOGICAL CONSIDERATIONS

8.1 Introduction

8.2 Empirical Evidence on the Choice of Technique in LDCs

8.2.1 The Approach

8.2.2 Choice of Technique Studies in the Weaving Industry in LDCs

8.3 The Capital-Output Ratio and its Limitations

8.4 Choice of Technique - the Neo-classical Approach

8.4.1 A Theoretical Overview

8.4.2 Modifications of the Textbook Version
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5 Limitations and Objections to the Neo-classical Approach</td>
<td>271</td>
</tr>
<tr>
<td>8.5.1 Do Alternative Techniques Exist?</td>
<td>272</td>
</tr>
<tr>
<td>8.5.2 Economies of Scale</td>
<td>274</td>
</tr>
<tr>
<td>8.5.3 Product Quality and Technology</td>
<td>276</td>
</tr>
<tr>
<td>8.5.4 The Goals of Investors</td>
<td>279</td>
</tr>
<tr>
<td>8.5.5 Uncertainty and Changes in Factor Prices</td>
<td>284</td>
</tr>
<tr>
<td>8.5.6 The Political Economy of Choice of Technique</td>
<td>285</td>
</tr>
<tr>
<td>8.5.7 The Influence of Market Structure</td>
<td>286</td>
</tr>
<tr>
<td>8.6 Conclusion</td>
<td>288</td>
</tr>
<tr>
<td>APPENDIX 8.1 The Slope of the Iso-cost Line</td>
<td>290</td>
</tr>
<tr>
<td>CHAPTER NINE : CHOICE OF TECHNIQUE IN THE INDONESIAN WEAVING INDUSTRY</td>
<td></td>
</tr>
<tr>
<td>9.1 Introduction</td>
<td>292</td>
</tr>
<tr>
<td>9.2 The Method of Approach</td>
<td>293</td>
</tr>
<tr>
<td>9.3 Construction of the Isoquant</td>
<td>298</td>
</tr>
<tr>
<td>9.4 Economic Efficiency and the Rationality of Investors in the Weaving Industry</td>
<td>292</td>
</tr>
<tr>
<td>9.4.1 Calculation of the Iso-cost Line</td>
<td>315</td>
</tr>
<tr>
<td>9.4.2 The Calculation of Boundary Prices</td>
<td>318</td>
</tr>
<tr>
<td>9.4.3 The Concept of Rationality</td>
<td>323</td>
</tr>
<tr>
<td>9.5 Shadow Prices</td>
<td>327</td>
</tr>
<tr>
<td>9.5.1 The Rationale of Shadow Prices</td>
<td>327</td>
</tr>
<tr>
<td>9.5.2 The Selection of Appropriate Shadow Factor Prices</td>
<td>329</td>
</tr>
<tr>
<td>9.5.3 The Effect of Shadow Prices</td>
<td>332</td>
</tr>
<tr>
<td>9.6 Choice of Technique in the Production of Sarung</td>
<td>334</td>
</tr>
<tr>
<td>9.6.1 Construction of the Isoquant</td>
<td>335</td>
</tr>
<tr>
<td>9.6.2 Calculation of Boundary Prices</td>
<td>338</td>
</tr>
<tr>
<td>9.7 Conclusion</td>
<td>340</td>
</tr>
<tr>
<td>APPENDIX 9.1 The Calculation of Labour : Machine Ratios</td>
<td>342</td>
</tr>
<tr>
<td>CHAPTER TEN: THE EFFECT OF ALTERNATIVE POLICIES</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>10.1 Introduction</td>
<td>345</td>
</tr>
<tr>
<td>10.2 The Exchange Rate</td>
<td>345</td>
</tr>
<tr>
<td>10.3 A Duty on Imported Equipment</td>
<td>346</td>
</tr>
<tr>
<td>10.4 Prohibition of the Import of Used Machinery</td>
<td>350</td>
</tr>
<tr>
<td>10.5 Additional Modifications</td>
<td>351</td>
</tr>
<tr>
<td>10.6 Conclusion</td>
<td>356</td>
</tr>
</tbody>
</table>

APPENDIX 10.1 Estimating Machinery Prices  

<table>
<thead>
<tr>
<th>CHAPTER ELEVEN: CONCLUSION AND POLICY RECOMMENDATIONS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1 Conclusion</td>
<td>361</td>
</tr>
<tr>
<td>11.2 Implications</td>
<td>366</td>
</tr>
<tr>
<td>11.3 Policy Recommendations</td>
<td>370</td>
</tr>
<tr>
<td>11.3.1 The Capital Market</td>
<td>372</td>
</tr>
<tr>
<td>11.3.2 Taxation Policy</td>
<td>376</td>
</tr>
<tr>
<td>11.3.3 Research and Development</td>
<td>379</td>
</tr>
<tr>
<td>11.3.4 Marketing Systems and the Small-Scale Sector</td>
<td>382</td>
</tr>
<tr>
<td>11.3.5 Other Policies</td>
<td>384</td>
</tr>
</tbody>
</table>

APPENDIX A: Research Methodology  

BIBLIOGRAPHY  

396
LIST OF TABLES

2.1 Unemployment in Indonesia, 1976 10
2.2 Underemployment in Indonesia, 1976 11
2.3 Employment and Labour Intensity in Indonesian Industry, 1974/75 19
2.4 The Japanese Weaving Industry, 1900-1955 24
2.5 Output of the Indian Weaving Industry by Sector, Selected Years 30
2.6 Estimate of Hand Loom and Power Loom Production, 1964-1974 31
3.1 Number of Power Looms and Improved Hand Looms, 1930-1940 44
3.2 Estimates of Power and Hand Loomage, 1949 46
3.3 Output and Productive Capacity, 1950-1966 55
3.4 Textile Employment by Firm Size, Region and Technology, 1963 59
4.1 Output of the Weaving Industry for Selected Years, 1968-1977/78 63
4.2 Number of Power Looms and Average Firm Size by Region and Ownership, 1976 66
4.3 Number of Power Loom Firms by Size of Firm, 1976 70
4.4 Investment Approvals for Weaving Firms Operating by 1978, According to Ownership 72
4.5 Power Loom Firms by Size of Firm and Date of Establishment, 1976 73
4.6 Registered and Actual Hand Looms, 1975 76
4.7 Cottage Weaving Activity by Region, 1974/75 81
4.8 Factory Employment in the Weaving Industry, 1963 and 1974/75 84
4.9 Employment in Large and Medium Weaving Firms, 1970-1977 85
4.10 Labour Hours per 1,000m² Production by Technique 86
4.13 Industrial Sub-Contracting in the Power Loom Sector  
4.14 Number of Power Looms by Nationality of Owner in Majalaya, 1948  
4.15 Investment Board Approvals by Ownership, Majalaya and Pekalongan  
4.16 Ownership, Management and Firm Size in the Majalaya Power Loom Sector, 1976  
4.17 Productive Capacity in the Spinning Industry by Ownership, 1976  
5.1 Percentage of Used Machinery in Total Investment in Fixed Assets in Japan, 1954-58  
5.2 Use of Second-Hand Looms in the Indonesian Weaving Industry, 1977  
5.3 Economic Performance of Government Weaving Mills, 1977  
6.1 The Composition of the Organised Credit Market, April 1979  
6.2 A Summary of Domestic Credit Sources  
6.3 Nominal and Real Interest Rates, 1967-1978  
6.4 State Bank Credit for the Textile Industry in the Special Region of Yogyakarta, 1974-1976  
6.5 Credit Sources in Survey of Firms, 1977  
7.1 Wage Levels by Technique, 1977  
7.2 Payments System According to Technique of Production Employed, 1977  
7.3 Average Percentage of Total Labour Costs Devoted to Fringe Benefits by Mechanisation and Capital Intensity, 1975/76  
7.4 Average Separation and Absenteeism Rates for Direct Employees by Wage Levels and Mechanisation, 1975/76  
7.5 Worker Characteristics of Direct Employees by Capital Intensity and Ownership, 1975/76
7.6 Nature of Training for Weavers and Preparation Workers by Firm Size, Technology and Ownership, 1975/76
7.7 Variations in Earnings of Hand Loom Weavers by Region and Type of Cloth, 1977
7.8 Hand Loom Wages and the Poverty Line by Region, 1977
7.9 Hourly Earnings in Small-Scale Non-Agricultural Activities, 1975/76
8.1 A Summary of Choice of Technique Studies in the Weaving Industry
9.1 Calculation of Value Added Per Metre for Cambric (Rp)
9.2 Monthly and Annual Output Per Loom (metres)
9.3 Investment Costs Per Loom (Rp)
9.4 Isoquant Calculations, Cambric
9.5 Iso-cost Slopes, Actual Prices
9.6 Boundary Prices, Cambric (n = 30 years)
9.7 Boundary Prices, Cambric (n = 15 years)
9.8 Iso-cost Slopes, Shadow Prices
9.9 Boundary Interest Rates, Cambric
9.10 Pre-Isoquant Calculations, Sarung
9.11 Isoquant Calculations, Sarung
9.12 Boundary Prices, Sarung (n = 30 years)
10.1 Isoquant Calculations, Devaluation
10.2 Boundary Prices, Devaluation
10.3 Isoquant Calculations, Import Duty
10.4 Boundary Prices, Import Duty
10.5 Isoquant Calculations, Used Machinery
10.6 Boundary Prices, Used Machinery
10.7 Investment Costs Per Loom Under Alternative Policies
A.1 Firms Visited by Location and Technology
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Diagrammatic Representation of Seasonal Influences on the Hand Loom Sector, 1977</td>
<td>78</td>
</tr>
<tr>
<td>4.2</td>
<td>Location of Major Weaving Centres in Java and Bali Visited During Fieldwork</td>
<td>98</td>
</tr>
<tr>
<td>8.1</td>
<td>Maximisation of the Output-Capital Ratio</td>
<td>264</td>
</tr>
<tr>
<td>8.2</td>
<td>The Textbook Isoquant</td>
<td>266</td>
</tr>
<tr>
<td>8.3</td>
<td>An Isoquant Representing a Discrete Production Function</td>
<td>269</td>
</tr>
<tr>
<td>8.4</td>
<td>An Isoquant Representing Fixed Technical Coefficients</td>
<td>273</td>
</tr>
<tr>
<td>8.5</td>
<td>Average Cost Curves and Technology</td>
<td>275</td>
</tr>
<tr>
<td>9.1</td>
<td>Iso-cost Lines of Different Slope</td>
<td>295</td>
</tr>
<tr>
<td>9.2</td>
<td>The Isoquant for Cambric</td>
<td>313</td>
</tr>
<tr>
<td>9.3</td>
<td>The Isoquant for Cambric, Power Looms Only</td>
<td>314</td>
</tr>
<tr>
<td>11.1</td>
<td>The Importance of Hand Loom Cloth between Income Groups</td>
<td>380</td>
</tr>
</tbody>
</table>
# LIST OF PLATES

<table>
<thead>
<tr>
<th>Plate</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Modern mechanised mill, fully-automatic looms (Pekalongan)</td>
<td>74</td>
</tr>
<tr>
<td>4.2</td>
<td>Medium scale mechanised mill, semi-automatic looms (Bandung)</td>
<td>74</td>
</tr>
<tr>
<td>4.3</td>
<td>Hand Loom weaver producing sarung (rural Jepara)</td>
<td>79</td>
</tr>
<tr>
<td>4.4</td>
<td>Cottage hand loom unit (rural Pekalongan)</td>
<td>79</td>
</tr>
</tbody>
</table>
GLOSSARY OF INDONESIAN TERMS

Alat Tenun Bukan Mesin (ATBM)  Improved hand loom
Alat Tenun Gedogan  Backstrap loom
Alat Tenun Mesin (ATM)  Power loom
Askrindo  A body which provides a credit guarantee for small firms borrowing from state banks
ASTEK (Asuransi Sosial Tenaga Kerja)  Employee social insurance fund
Badan Kordinasi Penanaman Modal (BKPM)  Capital Investment Co-ordinating Board
BAHANA

BAPINDO (Bank Pembangunan Indonesia)  State Development Bank
BAPPENAS (Badan Perencanaan Pembangunan Indonesia)  National Development Planning Board
Batik  Resist dye process in which wax is applied to cloth surface which is not to be dyed
Batik Cap  Batik method in which wax is applied by stamp
Batik Tulis  Batik method in which wax is applied by hand
BIPIK (Bimbingan dan Pengembangan Industri Kecil)  Program to guide and develop small industry
Biro Pusat Statistik (BPS)  Central Bureau of Statistics
Blaco
Borongan
Direktorat Jenderal Industri Tekstil
Gabungan Koperasi Batik Indonesia (GKBI)
Garis Kemiskinan
Golongan Ekonomi Lemah
Idul Fitri
Ijon
Induk
Kain
Kampung
Kodi
Koneksi
Koperasi
Kredit Investasi Kecil
Kredit Modal Kerja Permanen
Kredit Plafon
Kretek
Maakloon
Non Pribumi
Cambric
Piece-rates
Directorate-General of the Textile Industry
Indonesian Batik Producers' Association
Poverty Line
Weak economic groups (usually pribumi)
Celebration to mark the end of the Moslem fasting month
Practice of selling crops before they are ready to be harvested
Administrative unit which assists small firms
Cloth
Urban neighbourhood
20 pieces of cloth
Literally, good connections
Co-operative
Small credit program for fixed capital
Small credit program for working capital
Credit ceiling
Clove cigarette
Wage weaving (putting out)
Non-indigenous Indonesian (mainly Chinese)
<table>
<thead>
<tr>
<th>Term</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orde Baru</td>
<td>New Order (1966 and after)</td>
</tr>
<tr>
<td>Orde Lama</td>
<td>Old Order (before 1966)</td>
</tr>
<tr>
<td>Pak</td>
<td>Unit of measurement for yarn (4.5 kilograms)</td>
</tr>
<tr>
<td>Pedagang</td>
<td>Trader</td>
</tr>
<tr>
<td>Penanaman Modal Asing (PMA)</td>
<td>Foreign Investment</td>
</tr>
<tr>
<td>Penanaman Modal Dalam Negeri (PMDN)</td>
<td>Domestic Investment</td>
</tr>
<tr>
<td>Peraturan</td>
<td>Regulation</td>
</tr>
<tr>
<td>Perusahaan Daerah (PD)</td>
<td>State enterprise controlled by a provincial government</td>
</tr>
<tr>
<td>Perusahaan Listrik Negara (PLN)</td>
<td>State electricity company</td>
</tr>
<tr>
<td>Perusahaan Negara (PN)</td>
<td>State enterprise controlled by the central government</td>
</tr>
<tr>
<td>PN Industri Sandang</td>
<td>Central government textile conglomerate</td>
</tr>
<tr>
<td>Pribumi</td>
<td>Indigenous Indonesian</td>
</tr>
<tr>
<td>Pungli (Pungutan Liar)</td>
<td>Unofficial payments</td>
</tr>
<tr>
<td>Pusat Pelayan Tekstil (PPT)</td>
<td>Textile Service Centre</td>
</tr>
<tr>
<td>Rencana Urgensi Perekonomian (RUP)</td>
<td>Economic Urgency Plan</td>
</tr>
<tr>
<td>Repelita (Rencana Pembangunan Lima Tahun)</td>
<td>Five Year Development Plan</td>
</tr>
<tr>
<td>Rp (rupiah)</td>
<td>The Indonesian unit of currency</td>
</tr>
<tr>
<td>Sarung</td>
<td>Tubular garment worn around the body</td>
</tr>
<tr>
<td>Surat Keputusan</td>
<td>Decree</td>
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<tr>
<td>Zaman Keemasan</td>
<td>Golden era</td>
</tr>
</tbody>
</table>
Notes:

(1) Spelling of Indonesian words. In all cases the new (post 1972) spelling is employed.

(2) Administrative Structure in Indonesia. Government administrative structure in Java and Bali is as follows:

- National (Jakarta)
- Provincial (Propinsi) eg. Central Java
- Regency (Kabupaten) eg. Klaten
- Sub-Regency (kecamatan) eg. Pedan
- Municipality (kotamadya) eg. Solo
- Village (kelurahan)

(3) Exchange Rate. From August 1971 to November 1978, the exchange rate was Rp 415 = $US 1. Unless otherwise specified, dollar amounts are converted at this rate; all dollars are U.S. dollars.
GLOSSARY OF WEAVING TERMS

Weaving is the process by which two sets of threads of any substance are interlaced at right angles to form a fabric. The main pre-weaving (or preparation) stages which prepare yarn for the weaving process are:

- **pirn winding**, whereby the weft yarn is wound onto cones for insertion in the shuttle;
- **warping** and **beaming**, in which the warp yarn is wound side by side onto a beam to the desired length;
- **sizing**, which strengthens the yarn and makes it more compact.

The following technical terms are used in this thesis:

- **construction**: description of a woven fabric in terms of the number of warp and weft yarns per inch in a woven fabric, and the yarn count of the warp and weft yarns
- **ikat**: the process of resist dyeing portions of a warp or weft by tying off small bundles of yarn to prevent penetration of dye
- **knitting**: a fabric of single-element construction in which a yarn is continually looped upon itself by means of needles
- **loom**: a device used for weaving which holds the warp yarns taut and in the proper position
- **pick**: weft threads in a woven fabric
- **pick count**: the number of weft yarns per inch in a woven fabric
- **shuttle**: a device containing the weft yarns which inserts them through the warp
spinning  
the process of drawing out and twisting loose fibres to form a continuous strand of yarn

warp  
a set of parallel yarns which are the lengthwise element in a woven fabric

weft  
a set of yarns which are the crosswise element in a woven fabric

yarn  
a continuous strand of material spun from drawn-out and twisted fibres

yarn count  
the relative coarseness or fineness of a yarn; the greater the number, the finer the yarn
1.1 The Object of the Study

In his stimulating introductory note to a collection of articles on technology and employment in Less Developed Countries (LDCs), A.K. Sen (1975a) asserted that detailed, disaggregated studies of the industrial sector of LDCs are a "much neglected field of research". For too long, he argued, economists have accorded too much emphasis to the more esoteric aspects of industrialisation, and insufficient attention to "the details of technological economics". Speculating on the reasons for this trend, he concluded that it was mainly because the latter field lacks the glamour of the former:

The system of recognition and acclaim that applies in the world of economics does not particularly encourage the preparation of works concerned with details, however important they may be for practical planning (Sen, 1975a:vi).

An additional reason has been the lingering influence of Keynesian macro-economics on the thinking of economists and planners and the alleged success of Eastern European central planning. Both these influences have tended to play down the importance of micro-economic studies. Nevertheless, Sen maintained, "a shift in emphasis to the study of technological 'details' is long overdue"; oversimplified sectoral planning models based on flimsy micro data, he suggested, are of limited use.

This thesis is a study of the choice of technology in the Indonesian weaving industry. Two basic themes are pursued.

---

1 A third reason should be mentioned - the sheer hard work and time-consuming nature of field research in LDCs. Our approach to fieldwork and some of the difficulties experienced are discussed in Appendix A.
First, like Sen, we argue that questions regarding technological choice in the manufacturing sector can be answered only by adopting a disaggregated approach. This involves identifying the techniques which are currently in use in a given industry, measuring the performance of these techniques in a particular country and understanding the economic and political environment - in particular the nature of government policies and the state of factor markets - in which firms adopting these techniques must operate. It will be argued that worthwhile conclusions regarding the choice of technology can be reached only on the basis of thorough observation and understanding of a particular industry. 'Technological economics', to use Sen's phrase, requires industry-specific and country-specific studies.

The second major theme relates to the role of the government in mixed economies, such as that of Indonesia. Much is written in a general fashion of the undesirable effects of government policies which distort relative factor prices and encourage the adoption of techniques excessively capital-intensive given typical LDC factor endowments. Although formidable conceptual and measurement problems exist, one purpose of this thesis is to attempt to calculate the effects of alternative policies and combinations of factor prices on the choice of technique.

Discussions regarding the selection of industrial technology in LDCs and the alleged perverse effects of government policies involve two distinct issues. These may be put in the form of testable hypotheses:

(i) That investors are 'rational', that is, at given factor prices they choose the technique which minimises the cost of production.

(ii) That the removal of government-created factor price and other distortions will lead to the selection of techniques of production different (usually more labour-intensive) to those at present in use.
The primary purpose of the analytical section in the latter part of the thesis is to test each of these hypotheses.

The selection of industrial technology in LDCs is important because of the misallocation of resources arising out of private investors responding to 'incorrect' signals which result from market imperfections. In the context of LDCs, concern with such misallocation manifests itself more frequently in discussions of the problem of unemployment. Discussion of unemployment in LDCs can be misleading because the concept is not easily transferred to LDCs, and also because in these countries it is usually not the poor who are unemployed. Nevertheless, the modern manufacturing sector in many LDCs has a poor record of labour absorption, and there is a widespread belief that one of the contributing factors is the adoption of excessively capital-intensive techniques of production. Concern at this poor record is heightened by apparent changes in the institutional structure of LDC societies, whereby many of the traditional supports against economic hardship are disappearing. In the words of the Director of an Institute working on appropriate technology:

> The starting point of the work was a concern with the inadequate provision of employment in developing countries at a time when traditional methods of income-sharing are disappearing without, as yet, being replaced by the institutions of the welfare state (Pickett, 1977:773).²

1.2 The Approach of the Study

Although this thesis is not intended to be primarily an industry case-study, in order to examine the choice of technology at a disaggregated level it was necessary to choose

² Studies of the socio-economic effects of the commercialisation of agriculture and the introduction of high-yielding seeds have also pointed to the weakening of traditional obligations of landowners towards tenants and labourers (see Ahmad (1972:20) and Collier et al. (1973:41)).
one or at most two industries. For several reasons the Indonesian weaving industry is well suited to the aims of our study. First, it is an important industry, being (at the five digit level of industrial classification) the largest employer of labour in Indonesian manufacturing. Hence, any findings that apply to this industry are likely to be of some significance for the whole manufacturing sector. Secondly, a wide range of weaving techniques are in use, from the traditional back-strap loom to the most modern shuttleless looms. The two techniques at either end of the spectrum are not in wide use, but an analysis of the remaining four techniques provides a useful field for a choice of technique study.

A third reason for choosing the weaving industry is that quality differences between cloth produced by each of the techniques are not great; quality differences between techniques are probably less than in any other major manufacturing industry. This is an important consideration because choice of technique studies aim to calculate 'switching' or 'boundary' prices beyond which more labour-intensive techniques are preferable. If quality differences between techniques are substantial and the elasticity of substitution between different types of cloth is low, the possibility that a change in relative factor prices will induce the adoption of such techniques is correspondingly reduced. Finally the tasks performed by each of the weaving techniques (that is, the conversion into cloth of yarn which has undergone several preparation stages) are substantially the same. This is in contrast to some industries, particularly those which are agriculture-related, where more modern technologies incorporate several stages performed by traditional techniques, hence creating difficulties in attempting a direct comparison of techniques.

There are several reasons why extensive field research is the only method of obtaining reliable data for a study of this kind, and why it is also necessary for an adequate understanding of the industry and, to a lesser extent, the issues involved.
Secondary data on the industrial sector in Indonesia are still most inadequate. The 1974/75 Industrial Census provided the first comprehensive picture of manufacturing activity, but the data are not sufficiently detailed nor accurate for our purposes (see Appendix 4.1). Moreover, to obtain a broad view, it is desirable that all major parties in the industry be contacted, including weavers, government officials, representatives from business organisations and so on. Obtaining information from respondents, especially businessmen in the weaving industry, is a lengthy, time-consuming business. There are also considerable regional variations in the industry, which necessitate visits to all major weaving centres on Java at least. (Our research methodology is outlined in Appendix A.)

1.3 Outline of the Thesis

This thesis consists of three main parts. The first part serves as an introduction and background to the study and the issues. First we review the magnitude of unemployment and underemployment in Indonesia and examine the role of the weaving industry in LDCs; developments in the Indian and Japanese weaving industries are analysed and the implications for small-scale weaving in Indonesia considered (Chapter Two). In Chapters Three and Four we focus on the history and current structure of the Indonesian weaving industry. Because 1966 was a watershed in the recent history of the industry, the discussion is divided into developments before and after 1966. We emphasise the abrupt nature of changes in the industry - the rapid demise of the hand loom sector and the emergence of the modern mill sector - and other developments of relevance to a choice of technique study.

The second part of the thesis reviews the impact of government policies on the industry, and the nature of factor markets. Previous choice of technique studies in LDCs have tended to discuss the economic performance of different techniques in isolation from the politico-economic environment in which these techniques are used. However, owing to the
fragmented nature of factor markets and the propensity for
government intervention and regulation in Indonesia, these
studies are of limited relevance for our purposes. Chapter Five
examines the reasons for and nature of LDC government
intervention, and the industrial policies of the Indonesian
government. Particular attention is given to those policies
which distort relative factor prices and hence encourage
the adoption of excessively capital-intensive techniques.
Chapters Six and Seven analyse the capital and labour markets
respectively, with reference to the weaving industry. In
Chapter Six it is argued that interest rates are too low from
a social point of view, and that one effect of government
credit policies is to substantially limit the access of small
firms to the formal banking sector. In Chapter Seven we
examine the labour market which, by contrast, is far less
regulated. The magnitude of and reasons for wage variations
between firms employing different techniques are discussed,
and conditions of employment in hand loom firms are described.

The third part, which is the analytical section of the
thesis, consists of three chapters. In Chapter Eight the neo­
classical approach to the choice of technology is considered.
Its limitations are discussed in the context of the Indonesian
weaving industry, but none of them appears of sufficient weight
to rule out such an approach. In Chapter Nine the economic
performance of the techniques is compared with the aid of an
isoquant and iso-cost lines. The analysis is conducted for two
types of cloth using both market and shadow prices. In
Chapter Ten the effect of alternative government policies on the
efficiency of the techniques is considered. The main conclusion
to emerge from these chapters is that an intermediate mechanised
technique is socially optimal for the factory weaving sector
in Indonesia.

Finally, Chapter Eleven draws together our main conclusions
and some implications of the study, and formulates a range of
policy recommendations for the industry.
CHAPTER TWO

INDUSTRIALISATION, EMPLOYMENT AND THE ROLE OF THE WEAVING INDUSTRY IN DEVELOPING COUNTRIES

2.1 Introduction

Weaving is an important industry in LDCs. In countries where the manufacturing sector is relatively undeveloped, it is usually the major employer of labour at the five-digit level of industrial classification. The purpose of this chapter is to make some general observations about the weaving industry in the context of discussions regarding industrialisation and employment in LDCs. The weaving industry in India and Japan - two countries which have followed very different paths towards industrialisation - is examined in some detail. The implications of this analysis for the Indonesian weaving industry are discussed, with particular reference to options for government policy and the likely future role of small-scale weaving. First, however, it is useful to review briefly the concept of employment in LDCs, and present some recent data on labour utilisation from Indonesia.

2.2 Unemployment and Labour Utilisation in Indonesia

There are formidable definitional and conceptual problems in attempting to measure unemployment and underemployment in LDCs. The definition of unemployment used in western economies - of persons who are involuntarily idle and seeking work - is of limited relevance to LDCs for several reasons. Most of the economically active population is not employed on a wage-labour basis, hence the distinction between employment and unemployment is blurred (this is a characteristic of employment not just in the agriculture sector, but equally in the burgeoning urban informal sector). Also, being predominantly agricultural economies, labour-use is highly seasonal. Thus the numbers employed depend partly on the period in which the data are collected. Moreover, there are great institutional differences between rich and poor countries, the most important being the absence of government welfare programs for the unemployed in the
latter. It is this fact which has prompted many to argue that, whereas unemployment is a major cause of poverty in developed countries, in LDCs this is not the case because the poor literally cannot afford to be unemployed\(^1\) (Sundrum, 1975a: 5-6).

In order to estimate the dimensions of labour underutilisation, information on both open unemployment and hours worked of the employed is required. Some writers have gone further and advocated an 'income approach', whereby those who are working but whose earnings are below a certain minimum level should also be regarded as 'unemployed'.\(^2\) No doubt the purpose of economic development is the alleviation of poverty rather than merely the provision of jobs, regardless of the level of earnings. However, it is a misnomer to describe those working long hours for low incomes as 'underemployed' because it focuses on the issue of jobs rather than poverty; they should be called 'poor'. (In Chapter Seven, below, the nature of employment and earnings in the weaving industry is discussed.)

Prior to the mid 1970s there were no comprehensive and reliable labour utilisation statistics for Indonesia. The data from each of the post-independence population censuses were inadequate: those for 1961 because the reference period used (six months) was too long; those for 1971 because of the huge

---

1 Whilst there are unemployment data for most LDCs, much less is known about who constitutes the unemployed. However, one illuminating village survey in India found that of the poor, 'idle' (unemployed), and 'willing' (to work more), the poor were the largest single group, and that less than one-fifth of the idle were also poor and willing (quoted in Sundrum, 1975a:9-10).

2 For example, in their editorial introduction to the book of readings, Jolly et al. (1974:9) refer to the large numbers who are underemployed "in the sense of lacking the resources and opportunities for increasing their incomes to levels comparable to those of persons with urban jobs in the modern sector".
discrepancy between different series of the one census. During 1976 however, two national surveys were undertaken which yielded detailed information on unemployment and underemployment in Indonesia. The results of the National Labour Force Survey, SAKERNAS (Survey Angkatan Kerja Nasional), can be analysed to give some indication of the magnitude of the employment problem in Indonesia.

Some of the SAKERNAS data are presented in Tables 2.1 and 2.2. In general the results confirm the findings of other LDC surveys, of relatively low open unemployment - but quite high rates for particular groups - combined with considerable underemployment, as measured by number of hours worked per week. Open unemployment was only 2.3 percent for the country as a whole, but it was higher in urban areas, and for males, youth and the relatively well-educated (Table 2.1). The urban unemployment rate was four times that in rural areas. This is partly the result of the structure of urban economies and the sharper distinction being unemployment and employment. There were also considerable variations in the rate between urban centres. For example, in Java it was higher in the faster growing cities of West and East Java and Jakarta, than in Central Java and Yogyakarta. This lends prima facie support to the Harris-Todaro hypothesis that migrants are prepared to

3 In series C of the 1971 census, unemployment was recorded as being 2.2 percent whereas in series E it was 8.9 percent. The reason for this difference arose basically from the manner in which doubtful cases were treated. In series C they were recorded as employed, but in series E as unemployed (Jones, 1974:20-21). Note however, that in one attempt to reconcile these two estimates the rate of unemployment in Java was estimated to be around six percent (Sundrum, 1975b:262-265).

4 SAKERNAS data are used because the survey was undertaken from September to December 1976. The other survey in 1976 was SUPAS, the Inter-Censal Population Survey. This was carried out in March, during the height of the harvest season, and therefore resulted in an inflation of the size of the labour force and an underestimate of unemployment and underemployment.

5 The most detailed review of unemployment in LDCs is still that by Turnham, 1971.
Table 2.1: Unemployment in Indonesia, 1976

<table>
<thead>
<tr>
<th></th>
<th>Urban</th>
<th>Rural</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(percentage)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. By Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6.9</td>
<td>1.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Female</td>
<td>5.1</td>
<td>1.1</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6.3</td>
<td>1.6</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>2. By Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-19 years</td>
<td>19.3</td>
<td>4.7</td>
<td>6.4</td>
</tr>
<tr>
<td>20-29 years</td>
<td>12.3</td>
<td>2.8</td>
<td>4.5</td>
</tr>
<tr>
<td>30+ years</td>
<td>1.0</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>3. By Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No school</td>
<td>1.8</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Not finished Elementary School</td>
<td>4.3</td>
<td>1.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Finished Elementary School</td>
<td>5.5</td>
<td>1.8</td>
<td>2.4</td>
</tr>
<tr>
<td>Not finished Junior High School</td>
<td>8.3</td>
<td>4.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Finished Junior High School</td>
<td>6.9</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Not finished Senior High School</td>
<td>8.9</td>
<td>8.1</td>
<td>8.5</td>
</tr>
<tr>
<td>Finished Senior High School</td>
<td>11.7</td>
<td>7.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Not finished Academy/University</td>
<td>7.9</td>
<td>8.8</td>
<td>8.2</td>
</tr>
<tr>
<td>Finished Academy/University</td>
<td>3.1</td>
<td>4.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Not Stated</td>
<td>0.1</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5.6</td>
<td>1.3</td>
<td>1.9</td>
</tr>
</tbody>
</table>

3, Indonesia. Biro Pusat Statistik, 1977b:Table 25
Table 2.2: Underemployment in Indonesia, 1976

<table>
<thead>
<tr>
<th>Region/Hours worked per week</th>
<th>Male (percentage)</th>
<th>Female (percentage)</th>
<th>Indonesia (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.4</td>
<td>5.0</td>
<td>4.6</td>
</tr>
<tr>
<td>1. Urban</td>
<td>5.6</td>
<td>13.4</td>
<td>7.9</td>
</tr>
<tr>
<td>Temporarily not at work</td>
<td>7.4</td>
<td>12.2</td>
<td>8.8</td>
</tr>
<tr>
<td>&lt; 25 hours</td>
<td>60.1</td>
<td>43.8</td>
<td>55.3</td>
</tr>
<tr>
<td>25-34 &quot;</td>
<td>23.5</td>
<td>25.6</td>
<td>23.4</td>
</tr>
<tr>
<td>35-39 &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60+ &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2. Rural</td>
<td>6.7</td>
<td>9.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Temporarily not at work</td>
<td>14.9</td>
<td>28.7</td>
<td>19.7</td>
</tr>
<tr>
<td>&lt; 25 hours</td>
<td>13.9</td>
<td>18.3</td>
<td>15.4</td>
</tr>
<tr>
<td>25-34 &quot;</td>
<td>52.8</td>
<td>36.3</td>
<td>47.0</td>
</tr>
<tr>
<td>35-39 &quot;</td>
<td>11.7</td>
<td>7.6</td>
<td>10.4</td>
</tr>
<tr>
<td>60+ &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>3. All Indonesia</td>
<td>6.3</td>
<td>8.6</td>
<td>7.1</td>
</tr>
<tr>
<td>Temporarily not at work</td>
<td>13.4</td>
<td>26.7</td>
<td>18.0</td>
</tr>
<tr>
<td>&lt; 25 hours</td>
<td>12.9</td>
<td>17.6</td>
<td>14.5</td>
</tr>
<tr>
<td>25-34 &quot;</td>
<td>54.0</td>
<td>37.2</td>
<td>48.2</td>
</tr>
<tr>
<td>35-39 &quot;</td>
<td>13.4</td>
<td>9.9</td>
<td>12.2</td>
</tr>
<tr>
<td>60+ &quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

endure longer periods of unemployment in the hope of obtaining high wage employment.  

Unemployment rates differed markedly between age groups and according to educational attainments. Amongst the economically active population aged 30 or more it was negligible, but for urban youth it was almost one-fifth. One interpretation of these figures is that unemployment is likely to be a more serious problem in the next decade because many recent entrants to the labour force do not appear to be obtaining employment. However, a more plausible explanation is that the young are first-time job seekers and without the family responsibilities which would compel them to take whatever work is available. Further, a strong inverse correlation exists between age and educational attainment and, with the exception of tertiary graduates, unemployment rises with the level of education attained.

Although considerable differences exist in the rate of recorded unemployment among the city surveys, the 1971 Census, SUPAS and SAKERNAS, their findings regarding the composition of unemployment are broadly consistent. Useful as these unemployment data are, it must be remembered that the definition of 'employment' is very liberal. In the case of SAKERNAS, people were defined as employed if they worked an average of one hour daily during the reference week. Hence, it is equally important to consider the number of hours worked of the employed. Such a generous definition registers

6 A survey of the three principal cities of Java, Jakarta, Bandung and Surabaya, in 1972 found even higher unemployment rates than SAKERNAS. For the respective cities the rates were 11.0, 12.1 and 7.6 percent (Lembaga Demografi, 1974:17). A survey of two major cities of the Outer Islands (Palembang and Ujung Pandang) in 1975 also found higher rates, but not as high as those in the 1972 Java survey (Jones and Supraptiilah, 1976:36).

7 Because SAKERNAS does not contain information on unemployment by education, the SUPAS data are used. Although the unemployment rate differs, the SUPAS data are sufficient to indicate variations between different levels of education.
as employed many of those who are in fact underemployed. Two important conclusions emerge from the data regarding underemployment (Table 2.2). First, a significant proportion of the workforce works very long hours - almost one-eighth worked over 60 hours per week. Presumably many of these are engaged in low income, 'marginal' activities which necessitate such long hours. Secondly, at the other extreme, there is also considerable underemployment of labour as measured by hours worked. This is particularly significant in rural areas, where over one-third of persons employed worked for less than 35 hours per week. Undoubtedly many would accept more remunerative employment if it were available. In addition, a significant percentage of those working are classified as 'temporarily not at work'. Because it appears reasonable to assume that most of these are underemployed or out of work, it can be concluded that underemployment represents a serious problem in rural Indonesia and indeed in the country as a whole.

Thus labour underutilisation in Indonesia looms as a major economic, political and social problem. The dimensions of this underutilisation are difficult to quantify. One approach is to lump together the open unemployed and the underemployed as a measure of the 'employment problem', as for example the ILO report on Columbia did (ILO, 1974b:33). However, this is a mistaken view of the problem because the two are quite disparate groups. The open unemployed more likely refer to a small group in the community which can afford to sit out a period of unemployment in the hope of obtaining a better job. A more serious problem is those working relatively short hours, especially in rural areas and for whom additional productive employment opportunities do not exist. (This, of course, is in addition to the 'working poor', who work long hours.)

8 This group includes those who are on holidays, on strike and sick, employees whose firm has 'temporarily closed', and the self-employed who are 'awaiting work'. Apart from illness, the other categories are either inapplicable to rural areas or likely indicators of underemployment.
2.3 Industrialisation and Employment

2.3.1 General Observations

The labour-intensive nature of agriculture in LDCs and the rapid growth of the labour force has prompted many writers to argue that, for countries such as Indonesia, a substantial proportion of new entrants to the workforce must find employment in the manufacturing sector. However, putting aside the question of whether the labour-absorptive capacity of agriculture is so limited, the expectation that manufacturing can play a major role in employment generation is over-optimistic. In many LDCs, manufacturing employs less than 10 percent of the workforce. Assuming the workforce grows at three percent annually, manufacturing employment would have to expand at an annual rate in excess of 15 percent to absorb even half the new entrants to the labour force, to say nothing of the backlog of unemployed and underemployed workers. Thus, the first point to make in any discussion of industrialisation and employment is that manufacturing can never be the major employer of additions to the workforce (except of course for city states such as Hong Kong and Singapore). This is especially so considering its functions, in addition to employment creation, as an export earner and supplier of cheap mass consumption goods to other sectors of the economy. Even such a critical observer of the development strategies of non-socialist LDCs as Dudley Seers has remarked (1970:383-384) that for the modern manufacturing sector...

the danger of reduced efficiency affecting competitive power in world markets is a real one .... Therefore, one cannot go much further than the removal of biases which harm competitive efficiency.

Nevertheless, there is much concern over the slow growth in industrial employment in many LDCs, and the fact that it is

9 For example, in Indonesia it was 8.4 percent in 1976 (Indonesia. Biro Pusat Statistik, 1978c:Table 3.9).
lagging well behind output growth. In one sense this concern is misplaced: the fact that output growth exceeds employment growth simply means that labour productivity is rising. Indeed, if employment was growing faster than output it would be a real cause for concern, since it would imply falling productivity in already poor countries. There is a very real danger that an obsession with employment and labour intensity results in a failure to appreciate the necessity for rising productivity. (Defining labour intensity as the reciprocal of value added per employee, rising labour productivity by definition results in a reduction in labour intensity.) To give an illustration, a United Nations report assembled employment-output ratios for major industries in Asia and the Pacific. It found, as one would expect, that the ratios fell for every industry over the period 1955 to 1966. Rather than drawing the obvious conclusion that labour productivity was rising - this was never once mentioned - the report remarked:

The most interesting and important characteristic of these trends is the sharp and unremitting decline in the employment - output ratios in all groups of manufacturing (United Nations, 1972:29; my emphasis).

Conversely, it is important that the manufacturing sector generates as much employment as possible, consistent with the objective of ensuring an efficient allocation of resources. Although industry must become less labour-intensive if development is to occur, it can be argued that the record of labour absorption of the manufacturing sector of many LDCs should have been much better. This view has been expressed forcefully by Little, Scitovsky and Scott (1970), Ranis (1973) and others, who maintain that LDC governments have pursued policies which have an actual 'bias' against employment generation. The nature of these biases will be discussed in

10 For example, Ranis (1973:388) refers to the 'hothouse effect' of import substitution policies as the government mobilises resources to promote the highly protected infant industrial sector of LDCs. Initially, rapid increases in
Chapter Five below, and their effect on the competitiveness of different techniques in the Indonesian weaving industry will be considered in Chapters Nine and Ten. Ranis (1973: 395-401) suggests that conceptually there are at least three means by which more labour may be absorbed by industry in capital-scarce LDCs without reducing economic efficiency. These are:

(i) 'Machine-related capital-stretching innovations'. These involve the maximum possible use of a given stock of fixed capital, for example, by operating machines 24 hours per day or running them faster. The intensity with which machinery is used is important because it is possible for more mechanised equipment to generate more output and more employment per unit of capital than less mechanised equipment, if it is used more intensively.

(continued)

output and employment may be expected but, as the 'easy' phase of industrialisation is completed and the backlog in supply is overcome, the growth rates fall because industry is not sufficiently competitive to switch from the domestic to the overseas market. Such a scenario may well apply to Indonesia in the near future. During the 1970s industrial employment (at least in the 'factory' sector) and output have grown very quickly, but it is unlikely that these rates will be maintained unless fundamental changes in government policies occur (McCawley and Tait, 1979a:134).

It is for this reason that Sen (1975b:47) has warned against equating the terms 'mechanisation' and 'capital intensity'. He defines mechanisation as "the ratio of the value of the stock of machinery to the number of labourers who can be employed at a point of time when the machinery is in operation", and capital intensity as "the ratio of capital stock to the total amount of labour time over a given period, taking into account the points of time when the machinery is in operation as well as those when it is not". Clearly then, a more mechanised technique may be less capital-intensive, depending on the intensity with which it is used.
(ii) 'Machine-peripheral, capital-stretching innovations'. Whilst the core production process may be mechanised, there is much scope for employing manual technology in handling, inspection, packaging, transportation and other peripheral activities. However, their importance varies considerably between industries. In weaving they are relatively minor because it is an integrated production process containing relatively few distinct production stages.12

(iii) 'Plant-saving innovations'. These involve the adoption of less mechanised techniques in those industries for which such techniques are economically efficient. Owing to differences in the nature of the product and the technical characteristics of the production process, the rate of mechanisation will differ between industries. For example, within the textile industry, less mechanised techniques generally remain in use longer in weaving than in spinning after the onset of rapid industrialisation.13

This classification is useful for two reasons. First, it demonstrates that there is considerable scope for increasing the labour-absorptive capacity of manufacturing. It is not necessary, as some writers have argued, to resort to drastic (and, in the long term, probably counter productive) measures,

12 This also explains why the scope for industrial sub-contracting in the weaving industry is not great (see section 2.5.1, below).

13 Another policy to promote the use of labour-intensive techniques, much discussed in the recent literature, is to aim for a more equal distribution of income (Morawetz, 1974:512-514). Nevertheless, the poor do not necessarily purchase goods produced by labour-intensive techniques.
such as banning the introduction of new technology, to ensure sustained growth in industrial employment. Secondly, it provides a perspective in which to view this study. We shall be examining the third of these measures for expanding employment in manufacturing, namely the scope for adopting less mechanised (but economically efficient) weaving techniques if policy reforms can be effected.

2.3.2 Employment and the Weaving Industry

Weaving is an important industry well-suited to LDCs because its production process is neither skill nor capital-intensive. (However, for many countries, including Indonesia, it is import-intensive.) As an ILO study (1973:57) noted:

In the developing countries, the textile industry has had the advantage over others that the entry skill levels [for workers] have been very low and that literacy, for example, has hardly influenced performance.

Moreover, weaving skills already exist in LDCs and the industry produces an essential commodity.

Whilst there is considerable evidence regarding the labour intensity of weaving, estimates are hampered by the absence of data on capital (and hence capital-labour ratios). Consequently, value added per employee is usually used as the criterion for labour intensity. Adopting this ratio, Lary (1968:24-29) concluded on the basis of United States data that weaving was the sixth most labour-intensive of the 87 industries considered.¹⁴ In LDCs it is relatively more capital-intensive (ie. ranked higher) because of the multiplicity of labour-intensive firms in fairly small industries, particularly food processing. On the basis of the 1964/65 input-output table of India, cotton textiles ranked 34 out of the 77 industries in terms of capital intensity (Hazari and Krishnamurty, 1970:184). Data from the 1974/75 Industrial Census in Indonesia confirm the relative labour intensity of weaving. Amongst firms employing

¹⁴ The five industries more labour-intensive than weaving were boat-building and repairing, leather and leather products, lumber and wood products, apparel and related products, and knitting.
five or more employees, weaving is well down the list in terms of value added per employee, ranking six out of the 10 largest employers of labour (Table 2.3). Of the four more labour-intensive industries, two are characterised by a virtual absence of mechanisation (batik and tobacco drying) and presumably will not survive in their present form when real wages begin to rise substantially, one is mechanising quite rapidly (rice milling), and the other consists mostly of small-scale operations (printing and publishing). 15

A second data source containing estimates of labour intensity for Indonesian industry is the 1971 input-output table. However, inexplicably spinning emerges as being more labour-intensive than weaving, leather and wearing apparel. This
Although weaving is a labour-intensive activity and the income elasticity of demand for cloth in LDCs quite high, the industry will not necessarily be a major source of employment growth in LDCs, except of course in countries which successfully penetrate the export market for textiles. This is because weaving is an 'old', long-established activity which has existed for as long as clothing has been worn. Hence the existing pre-industrial technology is highly labour-intensive. The introduction of mechanised techniques (which nevertheless are labour-intensive compared to techniques in other modern sector industries) and the decline of primitive technology inevitably has labour-displacement effects, which may not be compensated for by increases in output.

Therefore even substantial increases in cloth output may well be associated with a decline or only minimal increase in weaving employment. By contrast, new industries, whose products (or close substitutes for them) were not used in pre-industrial society, are less likely to have this labour-displacement effect. Paradoxically, although many of these industries are relatively capital-intensive, their contribution to employment growth may be proportionately greater. This is not to argue that the weaving industry should not be encouraged, nor that the process of technical change in it should be slowed down. Rather, one should be rather less sanguine about the (net) employment creation potential of the industry, especially

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15 (continued)
confirms the impression that the table was prepared on the basis of scant statistical information, and that its chief value was as a training exercise.

16 The useful distinction between 'old' and 'new' industries, and its implications for choice of technology is discussed by Stewart (1978:197).

17 For example, a weaver using a back-strap loom produces just one metre of cloth per day, whereas an operator tending fully-automatic looms may produce up to 1,000 metres per shift (this is direct labour only).
when it is fulfilling an import substitution role as in Indonesia. (Recent changes in employment and output in the Indonesian weaving industry are discussed in Chapter Four below.)

2.4 The Role of the Weaving Industry in Developing Countries

In order to understand the role and nature of the weaving industry in LDCs, especially the small-scale sector, it is useful to discuss briefly the development of the industry in other countries. This section examines the Indian weaving industry after 1950, and the Japanese weaving industry before the Second World War. These countries are chosen because they followed very different paths to industrial development, but in each case small-scale industry in general, and weaving in particular, played an important role. Our aim will be to draw attention to the main features of weaving in each country, then consider the implications for the Indonesian weaving industry.

2.4.1 Japanese Industrialisation and the Weaving Industry, 1900-1955

2.4.1.1 The Sub-Contracting System

A leading economic historian of Japan has argued that, in contrast to the experience of many LDCs, its industrialisation ... appears to have been much less destructive of cottage and workshop industry. To a far greater degree the Japanese succeeded in modernising the production technique of the small establishment. More important, they strengthened it with external economies introduced by large-scale organisation in the supply of raw materials, working capital and markets (Lockwood, 1968:213).

Despite the limitations of inter-temporal and inter-country comparisons it is often argued that, because of the significant role of small-scale industry in Japanese economic development, LDCs have much to learn from its industrialisation experience. Lockwood has argued that a major factor explaining the importance of small firms was the nature of their relationship with larger firms. Rather than producing goods in direct competition, a
complementary structure evolved through the system of sub-contracting. This led to a situation which Crawcour (1954:217) has labelled 'stratified competition'. Competition was normally on a 'horizontal basis'. That is, it was confined to a single stratum of similar-sized firms, rather than vertically between small and large firms.

A distinction should be made between industrial and commercial sub-contracting. The former term refers to large firms putting out one or more stage of the production process to a smaller firm. The large (or parent) firm supplies the raw materials, sets the product specification and may assist in the provision of fixed capital, finance and technical advice. The extreme case is the small firm which is totally dependent on a single parent firm for orders. Here it is simply a production unit and the owner makes no commercial decisions. In contrast, commercial sub-contracting involves a trader or middleman placing an order with a firm, supplying the necessary raw materials and paying for the cost of conversion to the final product. Unlike industrial sub-contracting, the middleman plays a purely commercial-financial role. He is not involved in the production process itself other than in setting certain minimum quality standards. Thus, commercial sub-contracting does not necessarily involve a physical separation of the stages of production, whereas industrial sub-contracting does.

Several aspects of the sub-contracting system in Japan are relevant to our discussion below. First, apart from some small specialist producers, it was generally the larger firms which put out to the smaller ones. The latter were thus in a subordinate position, but they benefited from the large firm's superior access to credit, technical information and marketing opportunities. Secondly, sub-contracting benefited both parties, and in most industries it evolved gradually in
response to the needs of large and small firms, rather than at the direction of the government. Thirdly, and related to this, the motivation for large firms to put out was anything but altruistic. These firms resorted to this practice precisely because it was so lucrative, and competition between small firms for contracts so intense. Proponents of small-scale industry who see sub-contracting as a means of encouraging large firms to foster the growth of small firms for anything other than their own commercial advantage have a mistaken view of the Japanese system.

2.4.1.2 The Development of the Japanese Weaving Industry

The modern Japanese textile industry emerged during the Meiji Era (1868-1911). Under government patronage, spinning developed rapidly. The first mechanised spindles were imported in 1866, and by the time of the Russian-Japanese War (1894-95) the industry had almost completely mechanised (Seki, 1956:5-16). In weaving the story was different. The first mechanised looms were introduced in 1888, but it was not until the first decade of the twentieth century that the power loom sector began to grow substantially. In fact, weaving did not undergo a thorough transformation until during and after World War One. During the 1920s there were three distinct sectors in the weaving industry. First, the hand loom sector, which was in rapid decline. By 1923 the number of hand looms in operation fell to about one-quarter that of a decade earlier. Secondly, integrated mills, the fastest growing sector, the loomage of which more than tripled between 1913 and 1929 (24,000 to 74,000). Thirdly, the small and medium specialist weavers who expanded - though less rapidly than the integrated mills - and mechanised their operations (data on the industry up to 1933 are provided in Table 2.4 part (a)). Developments in the

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18 In this light it is surprising that, after an excellent review of sub-contracting in Japan, Watanabe (1971:72-73) concludes that for the system to operate successfully in LDCs, "government guidance and controls are indispensable", and "the most effective means of fostering the [correct] mentality is the moral education provided at elementary school". 
Table 2.4: The Japanese Weaving Industry, 1900-1955

(a) Number of Power Looms and Hand Looms, Various Years

<table>
<thead>
<tr>
<th></th>
<th>1900</th>
<th>1912</th>
<th>1923</th>
<th>1933</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Looms</td>
<td>32</td>
<td>111.7</td>
<td>246.3</td>
<td>291a</td>
</tr>
<tr>
<td>Hand Looms</td>
<td>700</td>
<td>621.6</td>
<td>159.4</td>
<td>59</td>
</tr>
</tbody>
</table>

(b) Workforce by Size of Firm

Distribution of Workforce by Firm Size (%)

<table>
<thead>
<tr>
<th>Firm Size (number of workers)</th>
<th>1935 All Weaving Firms</th>
<th>1955 All Weaving Firms</th>
<th>1955 Specialist Weaving Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>65</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td>50-199</td>
<td>14</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>&gt; 200</td>
<td>21</td>
<td>35</td>
<td>23</td>
</tr>
</tbody>
</table>

(c) Structure of the Specialist Weaving Sector, 1933

<table>
<thead>
<tr>
<th>Firm Size (number of workers)</th>
<th>Hand Looms</th>
<th>Power Looms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>54</td>
<td>9</td>
<td>63</td>
</tr>
<tr>
<td>10-49</td>
<td>4</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>1</td>
<td>127</td>
<td>128</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>217</td>
<td>276</td>
</tr>
</tbody>
</table>

(b) Uyeda et al., 1938:53
(c) Allen, 1940:576

Note: a An underestimate because loomage in the integrated sector refers to 1929. Note that this figure differs from that for power looms in part (c) of the table (217,000) because the latter refers only to specialist weavers.
weaving industry during the 1920s were significant enough for Allen (1946:121) to conclude that by 1929 "it had thrown off the last vestiges of primitive production processes".

During the 1930s the hand loom sector continued its decline. The power loom sector consisted of the two distinct groups, large integrated mills and smaller specialist weavers. The former were highly concentrated, and specialised in the production of plain cloth on wide looms. By contrast, the specialist weavers, who in 1935 contributed about two-thirds of the industry's output, produced a wide range of cloth, mostly on narrow power looms. Indeed, the two major types of cloth produced by these firms (drills and jeans) accounted for less than 20 percent of their total output. An indication of the structure of the industry in the 1930s is given in Table 2.4 (parts (b) and (c)). In 1935 almost two-thirds of the industry's workforce were employed in mills with less than 50 workers, and over half the loomage was in firms with fewer than 50 looms. A significant feature of the industry's development in the 1930s was that smaller specialist weavers expanded more rapidly than the integrated mills, which was a reversal of the trend in the 1920s. The explanation for this is the continued importance of traditional consumption patterns on the part of the Japanese. Specialist weavers were able to survive and expand because the types of cloth most in demand in the domestic market were better suited to the labour-intensive production processes of these smaller mills. Commenting on the position of these mills in the 1930s Allen (1940:579) observed that

... the diversified character of their market preserves them from competition of mass producers ... so long as the Japanese

19 In 1935 the six largest mills accounted for over 53 percent of the integrated sector's output, and 76 percent of mill sector output consisted of two types of cloth (shirting and sheeting), much of it for export (Allen, 1940:574-575).
2.4.2 The Development of the Indian Weaving Industry After 1950

2.4.2.1 The Ideology

India is one of the few LDCs in which the range of weaving techniques in existence is as great as Indonesia. For this reason alone it is important to examine the development of the Indian weaving industry. Like Indonesia, post-colonial governments have had a strong mistrust of the market as an allocative mechanism and hence they have intervened extensively in industry. It is useful to consider the policies which have been adopted and the success with which they have been implemented in discussing policy options for the Indonesian government.

Beginning with the First Five Year Plan (1951-55), the basic philosophy of successive governments towards industrial development has been, in the words of Dandekar and Rath (1970:115):

> Whenever a modern large-scale industry competed with and threatened the existence of a village industry, it was suggested that the appropriate method of protecting the village industry was to formulate a common production programme.

The main aims of this programme have been to hold back the modern sector and promote small industry wherever possible.

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20 The importance of the link between the slow change in consumption habits of the Japanese and the survival of small industry for the economy as a whole has been demonstrated by Ohkawa and Rosovsky (1961:483-484). They defined as indigenous industries those which are engaged in the production of final manufactured goods in general use before the Meiji Restoration. Using 1955 data they found that whereas establishments employing between four and 29 workers accounted for just 19.7 percent of total output among all industries, within indigenous industries this group accounted for 70.2 percent of total production.
This policy has been central to every Five Year Plan, and to the influential and far-reaching committees of enquiry into weaving and other industries. The suspicion and mistrust with which modern technology and the market are regarded is illustrated by the following extracts from two of the most important enquiries. First, in justifying government policies over the period 1950-1974, one report observed that:

Mill production, particularly because of the use of machines and mass production techniques, had an advantage over the hand loom production, and unless this advantage was counterbalanced it would finally make hand looms unproductive and a dying industry. [Government of India, Ministry of Commerce (hereafter referred to as Hand Loom Report), 1974:59].

Another report adopted a similar argument:

In a situation where these sectors co-exist, taxation should be such that those employing relatively better technology should bear a higher impost. The hand loom sector being the weakest of the three sectors of the textile industry, should, as far as possible, be exempt from taxation. [Government of India, Ministry of Industry (hereafter referred to as Asoka Mehta Report), 1964:93-94].

The logical conclusion of the second statement is that the economy would remain locked in a low level equilibrium: all technical innovations would have to be subject to discriminatory fiscal measures, because by definition they have an 'advantage' over traditional techniques. (Nevertheless, there may be a case for slowing down the rate of technical change to ease problems associated with structural adjustment in LDCs. See our discussion of Policy Recommendations in Chapter Eleven.) In practice however, governments have not acted as vigorously as their official statements might suggest, and there has been widespread evasion of many of the regulations. Much of this evasion and malpractice has been documented in a series of very frank and thorough reports yet, curiously, the
governments' reactions in many cases have been to recommend more regulations and procedures to overcome these problems.

In Chapter Five (section 5.2) below, some of the reasons for LDC government intervention and regulation are discussed. It is argued that there exists a widespread mistrust of the 'liberal model' and the market mechanism. In the case of India, several additional factors explain why successive Indian governments have promoted small industry. One has been the influence of Ghandi's teachings on the virtues of village industries. Another has been the fear of Indian planners that the unfettered introduction of modern technology would create massive unemployment. For example Professor Mahalanobis, the most influential economic advisor in India during the 1950s, argued in a draft recommendation on the Second Five Year Plan:

> Until unemployment is liquidated or brought under control, it is necessary to prevent competition by the factories and household or hand industries, by not permitting investment to be made in such consumer goods factories as would prevent expansion or lead to a shrinkage of employment in the hand industries (quoted in Dandekar and Rath, 1970:117).

As argued above, the 'employment argument' is not in itself a sufficient reason for protecting labour-intensive technology, because the earnings offered may be inadequate even at some bare minimum physical standard.\(^{21}\) Undoubtedly however, it has been an influential argument.

\(^{21}\) This the Indian Government came to realise in the 1950s with the ill-fated Ambar Charkha program. This involved the promotion of hand-spun yarn (an activity which, it will be recalled, disappeared within two decades of the introduction of spinning mills in Japan), to be supported by government subsidies to spinners. For an excellent discussion of the program and its inevitable failure, see Dandekar and Rath (1970:121-130).
2.4.2.2 The Structure and Growth of the Weaving Industry

Officially the industry in India is divided into two groups, the mill sector and the decentralised sector. The former consists of composite (integrated) mills and spinning mills; the latter includes all other weavers, ranging from substantial power loom firms to handloom weavers using hand-spun yarn. The mill sector was established during the colonial era. By World War Two it was relatively large and sophisticated by LDC standards, and during the latter part of the period of British rule it had begun to displace the handloom sector. However, the war gave handlooms a reprieve. The mill sector was geared up to meet defence needs, leaving the decentralised sector (at that stage, predominantly handlooms) to supply the domestic market. The temporary boost this gave to handlooms created problems of excess capacity when, upon completion of the war, the mill sector switched back to the domestic market. The difficulties experienced by the handloom sector during the period 1945-50 prompted the government to adopt protective measures which have continued in various forms ever since 1950. As a result, the mill sector, which is the best-organised component of the industry,\(^\text{22}\) has expanded its output only marginally since 1951, and from the mid 1950s it has actually fallen (Table 2.5). Its share of total output has fallen from almost 80 percent in 1950 to less than one-half in 1976. Correspondingly, its productive capacity has risen only marginally. Loomage increased from 195,000 in 1951 to 207,000 in 1977, whereas over the same period

\(^\text{22}\) It is interesting to observe the contrast between the mills' official body, The Indian Cotton Mills' Federation, and Pertexi, the Indonesian Textile Producers' Association. Since 1968 the Indian body has produced a thorough annual statistical survey of the industry, which also includes relevant international information (prices, productive capacity, etc). This was sent to the author on request, as also were full details of government regulations pertaining to the mill sector. Nothing of this sort is available in Indonesia. Although only a small point, it demonstrates the organisational weaknesses in the Indonesian industry and the obstacles to be overcome if, for example, it is to break into the export market.
Table 2.5: Output of the Indian Weaving Industry by Sector, Selected Years (million metres)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mill Sector</th>
<th>(%)</th>
<th>Decentralised Sector</th>
<th>(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>3,727</td>
<td>79</td>
<td>1,013</td>
<td>21</td>
<td>4,740</td>
</tr>
<tr>
<td>1956</td>
<td>4,852</td>
<td>75</td>
<td>1,663</td>
<td>25</td>
<td>6,515</td>
</tr>
<tr>
<td>1961</td>
<td>4,701</td>
<td>67</td>
<td>2,372</td>
<td>33</td>
<td>7,073</td>
</tr>
<tr>
<td>1966</td>
<td>4,239</td>
<td>58</td>
<td>3,097</td>
<td>42</td>
<td>7,336</td>
</tr>
<tr>
<td>1971</td>
<td>3,957</td>
<td>54</td>
<td>3,399</td>
<td>46</td>
<td>7,356</td>
</tr>
<tr>
<td>1976</td>
<td>3,881</td>
<td>49</td>
<td>4,064</td>
<td>51</td>
<td>7,945</td>
</tr>
</tbody>
</table>

Source: Indian Cotton Mills' Federation, 1977:21

Spindleage increased from 11 million to 19.8 million (Indian Cotton Mills Federation, 1977:16). The restrictions have resulted in low profitability, little incentive to modernise and poorer export performance.

Over the past three decades, therefore, growth in the industry has occurred almost entirely in the decentralised sector. The composition of output as between the hand and power looms in this sector is not known with certainty. Production estimates are based on yarn consumption, and handloom production is calculated as a residual of power loom and mill output. Owing to the large numbers of 'unauthorised' power looms in operation, estimates of shares depend on which estimate of power loom production is used. One writer suggests that the increase in handloom production over the decade 1964-1974 has been negligible, and that most of the increase has occurred in the power loom firms (Table 2.6).

Unlike Japan, in India there is less product specialisation between weaving firms employing different techniques. Handloom firms tend to consume relatively more yarn of high and low

23 A Reserve Bank of India survey found that over the period 1950-74, gross profit as a percentage of sales in the mill sector was eight percent or more in only four years (Survey of Indian Industry, 1975:137).
Table 2.6: Estimate of Hand Loom and Power Loom Production 1964 - 1974 (million metres)

<table>
<thead>
<tr>
<th>Year</th>
<th>Power Looms</th>
<th>(%)</th>
<th>Hand Looms</th>
<th>(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>1,050</td>
<td>34</td>
<td>2,016</td>
<td>66</td>
<td>3,066</td>
</tr>
<tr>
<td>1974</td>
<td>1,800</td>
<td>45</td>
<td>2,168</td>
<td>55</td>
<td>3,968</td>
</tr>
</tbody>
</table>

Source: Eapen, 1977:1682

counts and thus are more likely to serve either end of the market (high and low income consumers), whereas mills concentrate their production on yarn of middle counts (James, 1976:146-148). In general however, small and large weavers produce a range of cloth in direct competition with each other.

For weavers in the decentralised sector, there are three main marketing systems - weavers' co-operatives, master weavers and 'independent' weavers - each of about equal importance. The government has tolerated the master weavers, who employ hand loom weavers on a wage-labour basis or put out to cottage weavers (commercial sub-contracting). They are the most innovative group and, as the Hand Loom Report (1974:12) argued, they "perform an important function ... and it would be a serious mistake if at the present stage of development we try to abolish this sector". Eventually the government hopes that all small weavers will be incorporated into the co-operatives. There is a widespread feeling that these weavers are, in the words of the Asoka Mehta Report (1964:57), "in the grip" of middlemen who are "extorting unconscionably high rates of interest". However, whilst there are examples of successful co-operatives, in general their record has not been encouraging, particularly in the field of marketing. There is some evidence of misappropriation of government financial assistance, and most have yet to become fully-independent financially. Moreover, there has been a tendency for weavers to use them as
a distributor of the last resort, preferring to sell through traders when market conditions are favourable (Prasad, 1963:252-253).

In summary then, the picture of the industry to emerge is a large but static mill sector facing wide-ranging government controls; a very large hand loom sector by the standards of semi-industrialised LDCs, which will maintain its absolute production levels for as long as the government is prepared to support it; and a fairly dynamic power loom sector using non-automatic mechanised looms, and which is generating most of the industry's output growth. The technique in use in the power loom sector corresponds broadly to that in the Indonesian weaving industry which we will label M₂ below. In Chapters Nine and Ten it will be argued that this technique is socially optimal for Indonesia - a conclusion which may well apply to India also, given the similarity in production conditions and factor prices. If this is correct, the Indian government has been encouraging the most desirable technique virtually by default. The government has successively restricted the use of fully automatic looms, found mainly in the mill sector. The fastest-growing segment of the industry has been firms in the decentralised sector using non-automatic power looms (many of which use them illegally). An elaborate bureaucracy appears to have been erected to achieve a goal which could be met more easily through alternative policies.

2.4.2.3 Government Policies Towards the Weaving Industry

A wide variety of policies has been pursued by successive Indian governments in their attempt to foster the decentralised sector.

(i) Reservation Schemes and Restrictions on the Output of the Mill Sector: Since 1951 there have been controls on the output, physical capacity and range of products that may be produced by firms in the mill sector. The current policy is to restrict expansion in capacity to modernisation of machinery and production for the export market. The
reservation scheme has undergone several modifications. Initially a list of goods was drawn up which could be produced only by handloom firms and power loom firms with less than four looms. The inclusion of small power loom firms in the scheme reflected the government's attitude that smallness was at least as desirable as labour intensity. Indeed, in 1954 it embarked on a program of encouraging the substitution of power looms for hand looms, subject to very strict conditions. In 1964, owing to the widespread violation of these conditions, the program was dropped. The policy of the government now is to reserve some items exclusively for hand looms and a further list for hand looms and power loom firms with four or less looms. (For full details, see Hand Loom Report, 1974:57.)

(ii) Excise on Cloth: A differential excise tax was first introduced in 1953, when mill cloth was subjected to a higher levy. In 1955 this was extended to power loom firms with more than four looms. Currently handloom cloth is exempt from excise duty and power loom firms pay a lower duty, the exact rate being determined by a firm's loomage. (For details of changes since 1953 and current policy, see Hand Loom Report, 1974:74-86.)

(iii) Yarn Supplies and the Excise on Yarn: To ensure an adequate supply of yarn to the decentralised sector at 'fair' prices, the government requires that a certain (variable) percentage of the mills' yarn output be sold to this sector. An excise duty is also imposed on yarn not in hank form. (Yarn in hank form, which is suitable for use on hand looms, is exempt from duty.)
(iv) Other Policies: Among the many other policies to have been introduced are, first, periodic rebates on the sale of handloom cloth, the proceeds of which are distributed amongst the co-operatives; secondly, heavily subsidised credit from the Reserve Bank to the co-operatives; and thirdly, a wide range of promotional policies to assist hand looms, including technical aid, export promotion, marketing surveys and processing centres in the co-operatives.

2.4.2.4 Evaluation of the Policies

As one would expect, many of the programs to assist small weavers have run into formidable problems. By far the most difficult to implement have been those which seek to assist small power loom units (i.e. with four or less looms). Clearly, regulations which differentiate firms according to size rather than technique are virtually unenforceable, at least in the small-scale sector. Initial hopes that the twin goals of promoting small industry and modernising its technology could be reconciled through the encouragement of small power loom firms proved fruitless because of the widespread evasion. The effect of the regulations has been that the power loom firms have had the best of both worlds - enjoying the assistance the hand looms receive, but employing more sophisticated technology. As the 1974 Committee observed, the reservation schemes have been "honoured more in breach than in compliance", and concluded that:

Power looms have flouted the licensing laws and a large number of unlicensed power looms are in operation .... There is also substantial evidence that the power looms are making a number of varieties which have been reserved only for the hand looms (Hand Loom Report, 1974:5).

Obviously, once cloth leaves the producer it is very difficult to establish in what size power loom factory it was produced. Moreover, there is reported to have been widespread 'artificial'
division of firms. Firms which in reality are controlled by one person are separated physically to take advantage of the fiscal incentives. On the other hand, many of the firms obeying the legal maximum of four power looms have experienced marketing difficulties. Not surprisingly, in view of their size, they have been forced to operate on a putting out basis to cloth merchants. The Asoka Mehta Report (1964:88-89) regarded this as an 'unhealthy' and 'exploitative' practice which should be abolished. Yet it failed to mention that this was precisely the result of the government's policy of encouraging the proliferation of units which are too small to market their cloth independently.

Similarly, the power loom conversion program of the 1950s was unsuccessful, in part because of the government's preoccupation with smallness. The conditions of the scheme were onerous24 and, by the end of the Second Plan (1960), less than 9,000 of the targeted 35,000 power looms had been installed officially (Asoka Mehta Report, 1964:29). However, from 1958 onwards there was a rapid growth of 'unauthorised' power looms, that is, power looms installed in violation of one or more of the conditions. This problem has continued to bedevil the government ever since and, as noted above, is the cause of uncertainty regarding output shares in the decentralised sector.

Problems have also arisen with the other programs, although they have not been as serious. The periodic imposition of price controls on mill sector yarn sold to decentralised firms has not been successful. The mills have responded by selling inferior quality yarn at these prices, and a black market has developed for yarn. The requirement that a certain percentage

24 The nine main conditions included that they be located in rural areas, in the weaver's cottages, and that the allotment be one loom per weaver (Asoka Mehta Report, 1964:59).
of the mills' free yarn be produced in hank form has not been met. Moreover, there have been reports of power loom firms buying yarn in hank form to avoid the excise duty, and converting it to a form suitable for their looms. The government has declared this to be illegal, but it is an easy, inexpensive process which the government cannot prevent. Finally, the policy of promoting the co-operatives through the rebate system and the provision of cheap credit has not been particularly successful. More than one enquiry has recommended that the rebates be abolished because of the evident financial malpractices, but they are still being granted.

2.5 Implications for the Indonesian Weaving Industry

The history and current structure of the Indonesian weaving industry are discussed in the following two chapters. It is instructive however, to draw out some general implications from developments in the Indian and Japanese weaving industries, particularly as they affect the role of small-scale weavers. In analysing the prospects for small industry, it is useful to define its role with reference to large industry. For this purpose the following schema is illuminating. Small industry may:

(i) be interdependent with large industry, by operating as a sub-contractor to large firms; or

(ii) be independent of large industry, by producing different goods, or 'similar' goods of such different quality that in reality a different market is catered for; or

(iii) compete with large industry, in the sense that it produces goods which are close substitutes.

2.5.1 Case (i): Sub-contracting

We have seen that industrial sub-contracting was a major explanation for the survival of small industry in some
sectors of the Japanese economy. Nevertheless, it was not widely practised in the Japanese weaving industry. Consequently, this factor is unlikely to be important in the case of the Indonesian weaving industry. Indeed, to the extent that industrial sub-contracting occurs in the Indonesian industry, it is the reverse of the usual situation in Japan: small firms which do not possess a full range of weaving machinery 'put out' one or more of the production stages to larger mills. Industrial sub-contracting is well-suited to industries in which the production process is divisible into several distinct stages and the output from each intermediate stage is easily transported. Although there are several preparation stages in the weaving process, weaving is less divisible than most other industries. On the other hand, commercial sub-contracting was present in the Japanese weaving industry, and is found in the Indonesian weaving industry. However, the effect of commercial sub-contracting on the development of small industry is quite different. There is little, if any, transfer of technical and commercial knowledge between the two parties. Small weaving firms in Indonesia regard this as a last resort, and few firms regain their commercial independence after a period of commercial sub-contracting. (Sub-contracting in the Indonesian weaving industry is discussed in Chapter Four, section 4.8.)

2.5.2 Case (ii): Product Specialisation

The main reason small and medium-scale weaving firms flourished in Japan was the continued importance of traditional consumption habits. These resulted in a large domestic market
for types of cloth appropriate to the production technology employed by smaller firms. What is the relevance of this factor to the Indonesian weaving industry? Indonesia is
industrialising during an era when traditional modes of dress are disappearing quickly. The cultural continuity that was a
feature of Japanese society during modernisation is undoubtedly
much less important in Indonesia. Moreover, the major
traditional cloth in Indonesia is batik, both hand-drawn (batik
tulis) and stamped (batik cap). Yet the growth of the batik
industry is quite compatible with a modern, capital-intensive
weaving industry and the disappearance of small-scale weaving
because batik uses cambric produced by weaving mills. As
cambric is better suited to mass production techniques and is
produced mainly by the larger mechanised mills, the survival
and growth of the batik industry offers no protection to small-
scale weavers.

There is much scope for the production of handicraft
textiles in Indonesia, particularly for the export market (see
Chapter Eleven), but until recently this opportunity has not
been exploited.

2.5.3 Case (iii): Direct Competition

The Indonesian and Indian weaving industries most closely
resemble case (iii), where large and small firms are producing
in direct competition with one another. As the next chapter
will show, one of the reasons for this in Indonesia was
pervasive government intervention in the industry prior to
1966. It had the effect of encouraging small firms to produce
mass consumption textiles and devote little attention to
product specialisation. Case (iii) is the least desirable
strategy for LDCs wishing to foster small firms, because there
is a danger that the government will be pressured into erecting
costly and cumbersome controls which are not a permanent
solution to the development of viable small industry.

For Indonesian planners contemplating a program to protect
small-scale weavers, it is instructive to examine the policies
which have been adopted to assist the decentralised sector in India. It is almost certain that the problems that have arisen in their implementation would occur in Indonesia: the bureaucracy in Indonesia is probably weaker; there have been major changes in the government's policies, whereas successive Indian governments have pursued a broadly consistent industrial strategy (at least with respect to the textile industry); finally, there is a major division in the Indonesian business community between indigenous (pribumi) and non-indigenous (non-pribumi, principally Chinese but also Arab and Indian) entrepreneurs, which dominates industrial policy-making.

2.5.4 Weaving and Spinning Compared

A final point to emerge from our brief examination of the Indian and Japanese textile industries is the substantial difference between the weaving and spinning industries. It is important to draw attention to this because in Chapter One we emphasised the need for a disaggregated approach in choice of technique studies. Weaving and spinning are frequently lumped together in general discussions of industrialisation, yet the two industries are very different. Mechanisation usually proceeds more rapidly in spinning than weaving, and the degree of concentration is more pronounced. For example, in Japan, 95 percent of the workforce in spinning was employed in mills with 500 or more workers as early as 1924 (Orchard, 1930:185) - less than six decades after the commencement of rapid industrialisation. By contrast, thirty years later, more workers were employed in weaving mills with fewer than 50 employees than those with 200 or more employees; in the specialist weaving mills, almost one-half the total workforce was employed in firms with fewer than 50 workers (see Table 2.4, part (b)). A similar picture applies to the Indonesian textile industry (see Appendix 4.2).

There are two main explanations for the difference between spinning and weaving. First, the enormous gap in physical
productivity between the old and new technologies in spinning is not present to anything like the same degree in weaving. Secondly, the homogeneous nature of the output of spinning mills (yarn) is more suited to mass production lines and capital-intensive technology. Small weaving mills survive because they are able to specialise in the production of goods not suited to the operation of large mills.

Koh (1966:35 passim) argues that the difference in Japan arose primarily because different classes of investors were attracted to each of the industries. In spinning it was the emerging merchant class, with greater access to finance, whereas in weaving it was the wealthy peasant class. Yet this analysis does not explain why very different techniques were adopted in the two industries.
3.1 Introduction  
The development of the Indonesian weaving industry prior to the 1970s has already been the subject of two studies (Hiroshi, 1970 and Palmer, 1968, 1972), and thus it is not necessary to discuss events in great detail. A review of the industry during this period is useful however, in order to understand more recent developments in the weaving industry and its current structure. Also an examination of the industry during a period of pervasive government intervention in the economy - a characteristic of much of the colonial era and the earlier years of independence - provides a better perspective for an analysis of current government policies towards the industry (see Chapter Five).

3.2 The Colonial Era and Early Independence, 1900-1949  
3.2.1 Developments Before 1930  
Prior to the twentieth century, weaving was entirely a localised, household activity. Around the turn of the century the Resident of Priangan (now Bandung) - a major weaving centre - remarked that:

We hear the heavy sound of hand looms everywhere; from every house in every village. The industrious housewives weave more than needed for their family use and sell the extra in the markets nearby (quoted in Hiroshi, 1970:18).

Weavers used the alat tenun gedogan (backstrap loom) - still in wide use outside Java today - on which one metre of cloth could be produced in about seven hours. Cotton goods (mainly cloth) were imported first through Indian traders then, from the 1850s, through the East Indies Company. For most of the century they constituted Java's major import.  

1 Between 1823 and 1875 they accounted on average for half the value of Java's imports (Hiroshi, 1970:7).
The colonial government's restrictions on industrial expansion and the flood of imported Japanese and European textiles held back the expansion of the domestic textile industry during the latter part of the nineteenth century. Despite the duty on imported yarn however, hand weaving was able to survive in some measure because the imported cloth was not able to imitate the local cloth in pattern and design. Hand spinning disappeared fairly quickly in the face of competition from imported yarn, and before the turn of the century weavers were switching to imported machine-spun yarn. The resulting commercialisation of hand loom weaving led to the emergence of Chinese textile traders, a group which was to dominate the industry in coming years in trade and manufacture.

Some discussion of the role of industry in the Netherlands Indies had commenced around 1900 under the 'Ethical Policy', which was prompted in part by concern over declining indigenous living standards. In fact, it was a concern that manifested itself in little else other than discussion, as Furnivall (1944:332) explained:

About 1900 the industrialisation of Java was regarded as a master key to welfare .... But little was done, because little could be done; except by a sacrifice of Dutch interests which, in the existing political conditions, was impracticable.

The Dutch interests referred to were primarily those involved in the plantation sector, and industrialists in Holland who feared increased competition with their lucrative export business. In the words of Wertheim (1956:102):

During the entire period of the 'ethical policy', right up to the days of crisis in 1930, the government never made any serious beginning with industrialisation ... the powerful estate companies felt little sympathy for industrialisation, fearing that it might cause labour costs to rise and export possibilities to fall off, as a result of diminished imports of manufactured goods.
3.2.2 The Depression and the Beginnings of Industrialisation

The intransigence of the colonial government meant that it was left to external forces to provide the initial stimulus to industrial development. The first of these was World War One which, by reducing the supply of imported goods, led to a spurt in industrial production. This was of little lasting impact however, because post-war government policy remained unaltered, and trade and commerce quickly resumed their pre-1914 patterns. Of far greater impact was the world depression. Industrial expansion was essential because the drastic decline in export earnings resulted in a reduced capacity to import, and also because employment had to be found for the displaced plantation workers. Thus the 1930s marked the effective beginnings of Indonesia's industrialisation.

Given the new emphasis on industrialisation, it was logical that weaving be accorded a high priority. One reason was that cloth constituted an essential good which had long been made in the colony. Another was that a major technological advance had occurred in weaving with the development in 1926 of the ATBM (alat tenun bukan mesin or, literally, non-mechanised weaving loom) at the Bandung Textile Institute. The new loom, based on Dutch and Indian models, could produce between five and eight times as much cloth as the backstrap loom.

The world depression and the invention of the ATBM ushered in a period of rapid growth in the weaving industry in the 1930s, so much so that this decade is labelled the 'golden era' (zaman keemasan) in the history of hand looms in Indonesia. Factory employment in the hand loom sector appeared for the first time, and the number of hand and power looms rose manyfold between 1930 and 1940 (Table 3.1). Additional evidence of the industry's growth was the increased supply of yarn: yarn

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2 The colony's exports fell from 982 million guilders in 1928 to 274 million guilders in 1935; plantation employment fell from 521,381 in 1929 to 231,763 in 1934 (quoted in Indonesia. Direktorat Jenderal Industri Tekstil, 1976a:19-20).
Table 3.1: Number of Power Looms and Improved Hand Looms, 1930-1940

<table>
<thead>
<tr>
<th>Year</th>
<th>Power Looms</th>
<th>Hand Looms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>44</td>
<td>257</td>
</tr>
<tr>
<td>1931</td>
<td>44</td>
<td>524</td>
</tr>
<tr>
<td>1932</td>
<td>44</td>
<td>777</td>
</tr>
<tr>
<td>1933</td>
<td>46</td>
<td>1,299</td>
</tr>
<tr>
<td>1934</td>
<td>258</td>
<td>1,622</td>
</tr>
<tr>
<td>1935</td>
<td>414</td>
<td>3,915</td>
</tr>
<tr>
<td>1936</td>
<td>668</td>
<td>4,376</td>
</tr>
<tr>
<td>1937</td>
<td>2,000</td>
<td>12,000</td>
</tr>
<tr>
<td>1938</td>
<td>4,400</td>
<td>30,028</td>
</tr>
<tr>
<td>1939</td>
<td>6,600</td>
<td>35,000</td>
</tr>
<tr>
<td>1940</td>
<td>8,000</td>
<td>44,000</td>
</tr>
</tbody>
</table>

Source: Boeke, 1946:122.

Imports increased by 500 percent during the decade (Broek, 1942:83), and in the late 1930s two large spinning mills were established on the north coast of Central Java.

Initially at least the colonial government encouraged the industry's expansion. The Crisis Import Ordinance (1933), which sought to balance imports and exports through the use of import quotas and licences, was used to assist weavers by controlling the import of sarung. Later the duty on imported yarn was abolished. However, owing to the rapid growth in output, the government became increasingly concerned about 'over production' - in reality, fear of rising competition with Dutch imports - and attempted to control output. In the weaving industry this resulted in the regulation of 1935 that all establishments with 15 or more hand looms be licensed. In 1937 this was extended to units with five or more hand looms because of the continued expansion of small-scale weaving. Thus, the main aim of government policy was to control the larger firms through licensing requirements, and encourage small-scale
enterprise. Government assistance to the latter largely took the form of low interest loans and the establishment of co-operatives for the purchase of inputs and distribution of output. Nevertheless, there were contradictory elements in the policy because, by discouraging the expansion of small firms beyond a certain size, they were left very much under the control of the Chinese traders and financiers. As Palmer (1972:35) observed, in a remark of some relevance to the 1970s also,

So thoroughly had the Chinese pervaded the financial world that the technical and credit assistance offered by the government was never able to free the Indonesian producer from being in debt to Chinese moneylenders.

On the eve of World War Two, then, the industry had behind it a decade of sustained growth, albeit from a tiny base. According to the Manufacturing Census of 1939 - the only one to be conducted during the colonial era - weaving was one of the three substantial employers of labour in the factory sector. Out of a total factory workforce of 173,000, weaving employed a little more than 37,000 persons, fewer only than comestibles (food) and metal goods and repairs (Broek, 1942:82). Data on the cottage weaving industry are lacking, hence there are no reliable estimates of total employment in the industry. 3

3.2.3 War and the Independence Struggle, 1940-1949

If the 1930s were a period of expansion, all available evidence suggests that the 1940s were one of stagnation or at best minimal growth for the industry. The two estimates of loomage in 1949 given in Table 3.2 differ considerably; the second estimate probably overstates capacity because it is based on official data and the government’s licencing program had begun by then (see section 3.3 below). However, the

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3 On the eve of World War Two total cottage employment was estimated to be about 2.5 million (Castles, 1967:18). Given the government’s encouragement of small-scale weaving, it is reasonable to assume a fair proportion of these persons worked in the weaving industry.
### Table 3.2: Estimates of Power and Hand Loomage, 1949

<table>
<thead>
<tr>
<th>Region</th>
<th>Power Looms</th>
<th>Hand Looms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estimate 1:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Java</td>
<td>3,700</td>
<td>34,738</td>
</tr>
<tr>
<td>Central Java</td>
<td>1,170</td>
<td>13,492</td>
</tr>
<tr>
<td>East Java</td>
<td>1,618</td>
<td>8,018</td>
</tr>
<tr>
<td>Outer Islands</td>
<td>253</td>
<td>2,408</td>
</tr>
<tr>
<td><strong>All Indonesia</strong></td>
<td>6,741</td>
<td>58,656</td>
</tr>
<tr>
<td><strong>Estimate 2:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Indonesia</td>
<td>10,590</td>
<td>67,161</td>
</tr>
</tbody>
</table>


The general course of events are well known: the industry declined during the Japanese occupation (1942-1945), but recovered somewhat after 1945, notwithstanding the turbulent political events between 1945 and 1949. The effects of the occupation on the industry were very severe, especially the policies of prohibiting the import of raw cotton and dye-stuff and relocating centres of industrial activity, in some cases to other countries. For example, in the town of Majalaya, then the country's major weaving centre, it was reported that by 1945 only 25% of the prewar total of hand looms were left over ... and the textile industry had to rebuild itself from almost nothing (Hiroshi, 1970:43).

Given the dislocation of the occupation period, the stagnation of the industry in the 1940s suggested by estimate 1 in Table 3.2 is quite plausible.
An important feature of the industry during the 1940s was the increasing Chinese control of the manufacturing side of weaving. One estimate suggests that their ownership of power looms in the industry rose from 32 to 45 percent between 1942 and 1951, and that for hand looms from 35 to 40 percent (Harahap, 1952:68).  

To conclude this brief discussion of developments up to 1950, it is useful to highlight several aspects of the industry which were to influence its growth during the independence era. First, the factory sector of the industry was a relative late-starter and, with few exceptions, employed very labour-intensive technology. The weaving industry in Indonesia did not have the large modern sector which emerged in both the Indian and Japanese industries during the interwar period (see Chapter Two, section 2.4). Secondly, Chinese control over finance and trade was extensive from the very beginning. Moreover, although this group was not to dominate the manufacturing side until the 1970s, even by the 1940s it was playing a very important role. Thirdly, the industry was overwhelmingly Java-based, with only a tiny fraction of total capacity installed in the Outer Islands in 1949. The heaviest concentration within Java was the province of West Java, in which well over one-half the industry's loomage was located (Table 3.2). Finally, since the beginning of the

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4 These figures should be interpreted with caution however, as the observation was made in the politically-charged atmosphere of the early post-independence era. Elsewhere, for example, the writer reflects a widely held (although not necessarily accurate) belief, observing that during the independence struggle Chinese weavers vacated Majalaya to the relative peace and security of Bandung, where they established large mills (Harahap, 1952:63-64).

5 This also emerged from the 1939 Manufacturing Census. Weaving was the most Java-based of the major industries, with only 3.6 percent of its workforce in the 'Outer Provinces', whereas the percentage for manufacturing as a whole was 15.9 percent (Broek, 1942:82).
factory sector in the 1930s, government intervention in the industry had been widespread. Bureaucratic regulation in Indonesian industry is sometimes characterised as being mainly a post-independence phenomenon. However, at least in weaving the precedent (and, perhaps, the philosophy) was established by the colonial government.

3.3 The Industry After Independence, 1950-1966

Although independence was formally proclaimed in August 1945, it was not until 1950 that the struggle against the Dutch finished and the new republic was able to begin formulating economic policy. It is useful to discuss the development of the weaving industry during the period 1950-1966 with reference to government policy. This more than any other factor determined the industry's pattern of growth. Whilst weaving remained predominantly in private hands, government influence was pervasive, first through various plans for industry and secondly, after 1957, through intervention in distribution channels. These policies will be examined briefly, followed by a statistical review of the industry's development over the period. Our task is hampered by a paucity of reliable information, as the gaps and inconsistencies in Table 3.3 illustrate.

3.3.1 Government Plans for Industry

All three plans during this period - the Economic Urgency Plan (Rencana Urgensi Perekonomian, or RUP) of 1951, the Five Year Plan (1955-1960) and the Eight Year Overall Development Plan (1961-1968) - emphasised the importance of promoting industrial development. The problems that arose in the implementation of the first of these plans were documented in a series of reports by economists from the University of Indonesia. It is instructive to examine the RUP because many of the same problems are present in the 1970s, particularly those associated with government attempts to foster pribumi entrepreneurship.
The RUP had several main goals. First, industrialisation itself was seen as important, both to provide employment in densely-populated regions such as Java, and as a means of reversing the perceived decline in Indonesia's terms of trade. Secondly, pribumi participation in the economy was to be expanded, especially at the expense of the non-pribumi business community. Thirdly, the plan was to be implemented through the establishment of industrial co-operatives, in line with the opinion (held by such important figures as the then Vice-President, Moh. Hatta) that industrial organisation should be based on co-operative effort rather than competition. To achieve these goals the RUP envisaged a program consisting of four main elements:

(i) The General Processing and Production Plants (Induk Perusahaan). These were industry-specific units designed to assist small firms in the supply of raw materials, distribution of output, and the provision of technical and financial advice. Later it was hoped that they would develop complementary production facilities (eg. finishing for small textile firms).

(ii) The Small-Scale Mechanisation Program. Operating in conjunction with the induk, this was to provide low-interest credit to small firms to mechanise their operations.

(iii) The Large-Scale Industry Program. This was a scheme to establish large factories in several areas of light and heavy industry. Its details are not relevant to this discussion - no weaving firms were involved, although two spinning projects were. However, the considerable outlays on the project

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6 This view was held by many leading economic policy-makers including Professor Sumitro, who has been perhaps Indonesia's most influential economist since independence.
serve as a reminder that the government's orientation was not wholly or even predominantly in the direction of assisting only small-scale industry.

(iv) The Research and Training Institutes. These were designed to provide skilled labour for the industries being encouraged by the RUP. With training facilities for a little over 200 people, almost half of which were at one institute, the Bandung Textile Institute, the program was insignificant and was described by one observer as being on a 'woefully small scale' (Higgins, 1957:72).

The results of the RUP were extremely disappointing. As Sumitro (1954:710-716) observed in his very frank appraisal of the plan, none of the 51 induk was operating effectively. The textiles induk in Majalaya had little impact, and most of the small weaving firms continued to use their traditional channels of distribution (i.e. non-pribumi traders). In all centres it was much the same story: marketing aspects were neglected, and the supply of raw materials to the relatively few small firms relying on an induk was at best sporadic. The small-scale mechanisation program was even less successful. By May 1956, more than four years after its commencement, machinery had been ordered for some 82 enterprises. However, only 22 enterprises had actually received their machinery, and in only six (including two weaving firms) were the machines running 'continuously and satisfactorily' (Mulia, 1958:160). Not surprisingly, bad debts assumed such major proportions that by March 1958 just two percent of debts had been repaid (Palmer, 1972:88), with little hope of this figure being increased substantially.

7 In February 1978 we visited this induk. It was still operating and, subsequent to the Sumitro report, a finishing section had been added. Ironically however, for a unit which was to assist small pribumi firms, it had been leased to a non-pribumi manager for several years.
The reasons for the failure of the RUP and, in particular, the induk and small-scale mechanisation programs, have been documented in the reports by economists of the University of Indonesia (Sumitro, 1954, Zain and Mulia, 1957, and Mulia, 1958. See also Glassburner, 1962). Essentially, the problems arose because of the government's cumbersome bureaucratic procedures, its failure to appreciate fully the nature of the small-scale firms it was attempting to assist, and the shaky entrepreneurial base on which the scheme was superimposed. Indeed Professor Sadli, then Director of the University's Institute for Economic and Social Research, concluded pessimistically that

Without proper managerial skills from the side of the entrepreneur, we cannot see any useful purpose in continuing this mechanisation program (Preface to Mulia, 1958:158).

The bureaucratic obstacles were immense, because there were usually at least 40 stages involved from the initial application to approval and allocation of funds (Sumitro, 1954:720). Lengthy delays and poor co-ordination between the local and central offices of the Department of Industry and between departments were usual, aggravated by the requirement that imported machinery be ordered through the inexperienced benteng importers. The plan was also hampered by poor infrastructure. Fully 30 percent of the amount spent on machinery in the induk and mechanisation programs was used just to buy power generators (Sumitro, 1954:726). Thus scarce investment funds were diverted away from the programs' primary purposes and into the provision of services which should have been available prior to approval of a given project.

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8 The benteng program, which commenced in 1950, was designed to encourage pribumi businessmen by limiting the issue of licences to import certain goods to selected (pribumi) licence-holders, to whom lucrative monopoly profits accrued. By 1954 the scheme had been distorted to such an extent that the 'issuing of licences became primarily a means of financial support for the Nationalist Party' (Glassburner, 1971:88).
Further difficulties arose because there was no provision for credit for working capital under the mechanisation program. This was to be one of the functions of the induk but, owing to their mismanagement and the general shortage of funds, they were unable to fulfil it. Credit at concessional interest rates was available from government banks, but as Paauw (1960:77) observed, their operations were

... impractical when ready access to credit is required. Processing of loan applications by the government credit agencies is a slow cumbersome procedure, and the risks of rejection are great. Furthermore, strict collateral requirements are maintained unless credit is extended for political reasons, which is rarely true for small-scale borrowing.

Just as had occurred in the 1930s and was to occur in the 1970s (see Chapter Six), government plans to promote small pribumi enterprise floundered because of the inadequate provision of credit for working capital. These firms were forced to resort to non-pribumi financiers, the very group the scheme sought to circumvent.9

Reflecting the disillusionment with the government's industrial policies and the political climate, which increasingly favoured an expansion of government ownership of the economy, direct financial assistance to private industry was reduced greatly in the Five Year Plan (1955-1960). As Paauw (1963:219) remarks, in a comment even more appropriate to the situation after the nationalisation of Dutch enterprise in 1957: 'As a broad, costly national undertaking, the effort to create an Indonesian middle class of private industrialists was ended'. The Eight Year Overall Development Plan (1961-1968)

9 The importance of working capital is well illustrated in the case of the two successful weaving firms to participate in the small-scale mechanisation program. Both firms were assured of working capital and access to raw materials: the firm in Semarang because it worked on a putting-out basis (maakloon) for a larger firm, the firm in Gresik (East Java) because the owner had an importing firm and thus could obtain yarn (Mulia, 1958:169-171, 189-190).
further emphasised the development of the public sector, and for the first time a major expansion of state weaving mills was envisaged. The plan, to be financed by a loan from China, was beset by organisational difficulties, and was shelved when diplomatic relations between the two countries were suspended in 1966.  

3.3.2 Government Involvement in Distribution Channels

Until 1958 private traders controlled most of the textile trade, despite growing government intervention in the economy. There had been periodic attempts to intervene directly in the allocation of yarn to ensure supplies for small weavers, but these were generally shortlived. In any case, the difference between official and free market prices was not great. However, three factors changed the nature of distribution channels from the late 1950s, and hastened government intervention on a much greater scale. These were first, the nationalisation of most Dutch property in 1957, including the Dutch importing houses; secondly, the government regulation that, as of 1 January 1960, all 'alien' (i.e. non-pribumi) traders were to be removed from rural areas and replaced by retail co-operatives; and thirdly, the slump in the weaving industry during 1957 and 1958 (see Table 3.3) caused by the policy of the Department of Trade - charged with responsibility for import rationing - of importing cloth rather than yarn. The first of these factors led to the development of the State Trading Enterprises (Perusahaan Dagang Negara, or PDN) whilst the second, owing to the subsequent failure of many retail co-operatives, necessitated direct government intervention to prevent widespread shortages of consumer goods (Paauw, 1963:210-211).

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10 In all, seven factories were to be established, with a total capacity of 1,000 power looms. Significantly, all but one of these mills was to be located outside Java (Far Eastern Economic Review, 1962:96), a move undoubtedly designed to appease strong anti-Java feelings in the Outer Islands, which had resulted in armed insurrection in 1957 and 1958.
From 1958 to 1965 distribution channels were dominated by the PDNs and the weavers' co-operatives (KOPTEXI for small and medium firms, and OPS for large firms), through which the bulk of yarn supplies were to be allocated. Each firm was given a quota of yarn. For large firms this was based on the assumption that they operated for two shifts per day, whilst for the remainder one shift was assumed. As long as supplies of yarn remained adequate, the difference between free market and official prices was small. After 1960 however, successive balance of payments problems led to serious yarn shortages at official prices; by 1964 the price disparity was as high as 17:1 (Palmer, 1968:153). This fact, combined with rapidly deteriorating real official incomes for public sector employees, resulted in massive and widespread abuse of the scheme. Licences were lucrative and highly sought after, resulting in the establishment of nominal firms, the sole purpose of which was to re-sell yarn obtained at low official prices on the free (i.e. black) market. Indeed, so great was the corruption and so weak the machinery for supervision that Palmer (1972:173) estimated that about one-half the official yarn allocations entered the free market.

3.3.3 A Review of Developments 1950-1966

Appraisal of the industry's development is hampered by the absence of reliable production data. Official data for textile output refer to both weaving and knitting and, in any case, the general decline in administrative efficiency must have affected the accuracy of data collected. Bearing these factors in mind, the growth of the weaving industry can be divided into two phases. Until the mid 1950s, output grew quickly, by about 150 percent from 1950 to 1955 (or 17 percent annually). This appears to have been more the result of a

11 Developments over this period are discussed in detail by Palmer (1972:125-176).
12 Note that production data from 1950 to 1956 refer to large and medium firms. No estimates are available for small-scale weavers, but it is not unreasonable to assume their output growth followed a similar trend.
Table 3.3: Output and Productive Capacity, 1950-1966

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Looms</th>
<th>Production (million metres)</th>
<th>Potential</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hand (1)</td>
<td>Power (2)</td>
<td>Large &amp; Medium Firms (4)</td>
<td>All Firms(^a)</td>
</tr>
<tr>
<td>1950</td>
<td>72,001</td>
<td>11,322</td>
<td>268.8</td>
<td>40.5</td>
</tr>
<tr>
<td>1951</td>
<td>71,095</td>
<td>11,971</td>
<td>274.6</td>
<td>40.9</td>
</tr>
<tr>
<td>1952</td>
<td>69,052</td>
<td>12,119</td>
<td>272.4</td>
<td>60.7</td>
</tr>
<tr>
<td>1953</td>
<td>67,746</td>
<td>12,994</td>
<td>280.0</td>
<td>81.0</td>
</tr>
<tr>
<td>1954</td>
<td>75,435</td>
<td>12,480</td>
<td>286.8</td>
<td>89.3</td>
</tr>
<tr>
<td>1955</td>
<td>78,857</td>
<td>12,697</td>
<td>297.8</td>
<td>101.4</td>
</tr>
<tr>
<td>1956</td>
<td>84,935</td>
<td>11,477</td>
<td>295.3</td>
<td>102.1</td>
</tr>
<tr>
<td>1957</td>
<td>115,522</td>
<td>15,301</td>
<td>374.2</td>
<td>n.a.</td>
</tr>
<tr>
<td>1958</td>
<td>118,897</td>
<td>16,524</td>
<td>418.7</td>
<td>&quot;</td>
</tr>
<tr>
<td>1959</td>
<td>151,065</td>
<td>17,042</td>
<td>n.a.</td>
<td>&quot;</td>
</tr>
<tr>
<td>1960</td>
<td>150,000</td>
<td>16,896</td>
<td>482.8</td>
<td>&quot;</td>
</tr>
<tr>
<td>1961</td>
<td>154,300</td>
<td>18,002</td>
<td>n.a.</td>
<td>&quot;</td>
</tr>
<tr>
<td>1962</td>
<td>223,905</td>
<td>20,284</td>
<td>663.7</td>
<td>&quot;</td>
</tr>
<tr>
<td>1963</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>&quot;</td>
</tr>
<tr>
<td>1964</td>
<td>n.a.</td>
<td>n.a.</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>1965</td>
<td>324,000</td>
<td>27,000</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>1966</td>
<td>284,430</td>
<td>26,536</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Sources and Definitions:

1. **Number of Looms**
Table 3.3 (continued)

(ii) Production

Potential: Palmer, 1968:82, based on licensed loom capacity under normal working conditions

Large and Medium: Panglaykim, 1960:28, using BPS data

Firms

All Firms:
1955-1959 Sadli et al., 1961:2-3. For large and medium firms using BPS data; for small and cottage units, based on estimates of yarn usage

Note: a KOPTEXI, the Textile Producers' Co-operative, presented alternative production data for the years 1961 to 1964, respectively 403.5, 310.6, 272.4 and 193.8 million metres (Far Eastern Economic Review, 1967:100). From 1961 to 1963, the difference between the two sources is small (less than 10 percent), but for 1964 it is very large. Owing to the allocation system (see text), the KOPTEXI data are probably less reliable.
return to normal economic conditions rather than an expansion of productive capacity, because loomage did not increase significantly (Columns (1) and (2), Table 3.3). Thereafter, the industry's output was characterised by wild year-to-year fluctuations depending on whether the government used scarce foreign exchange to import yarn or cloth. Thus, huge changes in output which might otherwise be interpreted as faulty statistics become reasonably plausible: for example, output doubled from 1959 to 1960, but this was the result of the near doubling of yarn imports, from 33,000 tons in 1959 to 61,500 tons in 1960 (Indonesia. Direktorat Jenderal Industri Tekstil, 1976a:29). After 1957, estimates of productive capacity bear little relation to the likely number of looms actually in use, especially for hand looms. The data refer to licensed capacity, which rose annually regardless of the trend in output.

The early and mid 1960s are usually portrayed as a period of mounting economic chaos. Whilst from a national point of view this is undoubtedly correct, it should not be forgotten that many firms flourished under the yarn distribution system. Once a quota was obtained, profitability was guaranteed either by re-selling the yarn on the free market, or producing cloth for what had become very much a seller's market. Another misconception is to see government intervention after 1957 as primarily assisting small firms. Whilst this may have been the government's intent, in practice, as Palmer (1972:246) observed:

The unorganised small-scale entrepreneurs were easily misled into paying extra sums because they were never fully aware what the allocations were supposed to be.¹⁴

¹³ In fact, one government mill in its company history described the period 1957-1965 as "the golden era (zaman keemasan) for textile firms, because rather than goods chasing money it was money chasing goods. Hence any cloth could be sold, however poor its quality".

¹⁴ A similar conclusion is reached by Rice (1972:20) in his three industry study in North Sumatra in 1965.
Not surprisingly, political connections were of paramount importance in obtaining quotas, and large firms were more powerful and better connected.

Comprehensive employment estimates for the industry are not available, but informed guesses can be made on the basis of two sources of data. The first is the 1961 Manufacturing Survey, which included only medium and large firms (employing 10 or more workers). Weaving employed a little over 63,000 persons (Indonesia. Biro Pusat Statistik, 1964), which indicates the extent to which licensed hand loom capacity had been inflated even by 1961. ¹⁵

The second source is the 1964 Industrial Census (which actually refers to 1963), the first such census to be conducted after independence. This provides more detailed information on employment - by region, size of firm and technology - and it also included small firms. However, an important deficiency is that data are given only at the three-digit level of industrial classification, which means that weaving was not separated from textiles. Table 3.4 presents a breakdown of employment in textiles in 1963. Assuming weaving employment was distributed between regions in roughly similar proportion to that of textiles, weaving remained very much a Java-based industry, with barely six percent of the workforce employed in the Outer Islands.

In order to estimate total employment in the weaving industry in 1963 some arbitrary assumptions regarding the proportion of weaving employment in textiles must be made:

(i) Power loom employment. The census recorded 27,116 workers as being in textile firms with a workforce of 500 or more employees. Since there were very few

¹⁵ Assume (conservatively) that all the power looms and half the hand looms were in medium and large firms. Assume also 1.5 workers per hand loom and one worker per power loom. The licensed capacity figure for 1961 would suggest employment in medium and large firms of about 134,000 persons\[0.5(154,300)\] + \(18,002\) \(1\)], whereas actual employment was less than half this!
Table 3.4: Textile Employment by Firm Size, Region and Technology, 1963

<table>
<thead>
<tr>
<th>Region</th>
<th>Size of Firm (Workforce)</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>25-49</td>
<td>50-199</td>
<td>&gt; 200</td>
<td></td>
</tr>
<tr>
<td>(a) Firms Using Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jakarta and West Java</td>
<td>7,578</td>
<td>5,132</td>
<td>14,362</td>
<td>22,094</td>
<td>44,571&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Central Java and Yogyakarta</td>
<td>449</td>
<td>692</td>
<td>6,074</td>
<td>16,131</td>
<td>23,346</td>
</tr>
<tr>
<td>East Java</td>
<td>466</td>
<td>481</td>
<td>4,620</td>
<td>7,839</td>
<td>14,406</td>
</tr>
<tr>
<td>All Other</td>
<td>620</td>
<td>678</td>
<td>1,642</td>
<td>1,256</td>
<td>4,196</td>
</tr>
<tr>
<td>Indonesia</td>
<td>9,113</td>
<td>6,983</td>
<td>26,698</td>
<td>43,725</td>
<td>86,519&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>(b) Firms Not Using Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jakarta and West Java</td>
<td>27,533</td>
<td>8,586</td>
<td>6,225</td>
<td>250</td>
<td>42,594</td>
</tr>
<tr>
<td>Central Java and Yogyakarta</td>
<td>53,041</td>
<td>14,608</td>
<td>7,810</td>
<td>1,040</td>
<td>76,499</td>
</tr>
<tr>
<td>East Java</td>
<td>11,744</td>
<td>4,525</td>
<td>5,920</td>
<td>6,673</td>
<td>28,864</td>
</tr>
<tr>
<td>All Other</td>
<td>5,091</td>
<td>3,724</td>
<td>2,340</td>
<td>325</td>
<td>11,480</td>
</tr>
<tr>
<td>Indonesia</td>
<td>97,409</td>
<td>31,443</td>
<td>22,295</td>
<td>8,290&lt;sup&gt;c&lt;/sup&gt;</td>
<td>159,524&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>


Notes:  
<sup>a</sup> For firms using power, includes those with a workforce of 5-24 persons; for firms not using power, 10-24 persons  
<sup>b</sup> Row does not sum in original  
<sup>c</sup> Column does not sum in original
large weaving mills, almost all of these must have been in spinning, an assumption supported by the fact that several large state spinning mills were established prior to 1964. Assume, therefore, that 3,000 workers were in these very large weaving mills, and that weaving accounted for one-half of the remaining textile employment (i.e. in firms with fewer than 500 workers). This suggests a workforce of around 32,000 in the power loom sector, an estimate which accords with power loom capacity of between 20,000 and 27,000 units. 16

(ii) Hand loom employment. Estimating hand loom employment is even more hazardous. Clearly however, hand loom weaving was the major activity in non-mechanised textile firms: hand spinning had all but disappeared, batik was still predominantly a cottage industry and knitting was not important. A reasonable assumption would be that weaving accounted for about three-quarters of employment in the non-mechanised textile factories, suggesting a figure of about 120,000. This tallies approximately with the licensed hand loom capacity of 1956 (84,000 looms, 1.5 workers per loom), the last year before the yarn allocation system rendered such data meaningless. No estimates are available for cottage weaving employment.

Thus employment in the industry in 1964 was probably about 150,000 persons at most. It may have been greater to the extent that cottage weaving employed significant numbers, or (more likely) less to the extent that many hand loom weavers were not engaged full time in the industry.

16 This is similar to an ILO (1973:65) estimate of 31,100 for 1966, although no explanation is given as to how this figure is reached.
In summary then, cloth output had increased considerably since independence, but the weaving industry remained relatively undeveloped. Indeed, it is remarkable how little the basic structure of the industry had changed since the late 1930s. There were virtually no large factories by international standards. Government plans to establish modern state mills had not been finalised before the change of government in 1966. In the uncertain economic and political climate, private investors were not inclined to undertake large investments in modern plants. All foreign-owned factories had been nationalised. The Chinese business community faced increased harassment. Well connected and politically influential businessmen in the industry - the only group that might have been in a position to invest - had little incentive to do so. Re-selling yarn on the free market was a far more profitable alternative.
CHAPTER FOUR

THE WEAVING INDUSTRY UNDER THE NEW ORDER GOVERNMENT

4.1 Introduction

Developments in the industry after 1966 are in marked contrast to those of the previous decade. The New Order Government of President Suharto, generally dated from the Ampera Cabinet of March 1966, reversed the political and economic priorities of the previous regime. By the late 1960s the government had brought the runaway inflation under control and established a degree of stability for investors. A diminished role for the government and greater reliance on market forces were emphasised, although government intervention has remained very substantial.

The effects of these changes on the weaving industry have been little short of dramatic. A virtual technological revolution has occurred in the industry. Modern technology has been introduced very rapidly and the hand loom sector has shrunk to be only a fraction of its size 15 years ago. Foreign investors have returned to the industry, and the Chinese business community has invested heavily in it. Thus the 1970s witnessed the emergence of the modern textile industry in Indonesia. So profound have the changes been that an economist who studied the industry during the orde lama, Dr Ingrid Palmer, recently described the industry as 'virtually unrecognisable' in comparison with that of the 1960s (personal communication).

The purpose of this chapter is to analyse recent developments in the industry and its current structure. There have been substantial improvements in the scope and accuracy of data, which greatly assist our task. An understanding of the industry is essential in order, first, to discuss the government's industrial policies and future options (Chapters Five and Eleven), and secondly, to assess the economic performance of the main techniques in the industry (Chapters Eight to Ten). The following sections will examine output and
employment trends, the nature of the power loom and hand loom sectors, the structure of the industry, the incidence of subcontracting, and some changes at the regional level. Appendices will survey secondary data sources for the industry, analyse differences in the structure of the weaving and spinning industries, and present several brief case studies of successful hand loom firms.

4.2 Output

The stagnation and decline of the early and mid 1960s has given way to an era of rapid and sustained growth. Output has more than quadrupled over the period 1968 - 1977/78 (Table 4.1).\(^1\) Weaving has been one of the most spectacular successes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output  (million metres)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>245</td>
<td>372</td>
<td>769</td>
<td>877</td>
<td>994</td>
<td>1,073</td>
<td></td>
</tr>
<tr>
<td>Annual Average Growth Rate (%)</td>
<td>52</td>
<td>20</td>
<td>7</td>
<td>13</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

1976/77-1977/78 U.S. Embassy, 1979:Table A
(Note: All sources use data from the Department of Industry.)

\(^1\) Unfortunately, output data for the weaving industry are not given in the annual Lampiran Pidato Kenegaraan, despite the fact that they are provided for many less important industries. However, total textile output, which includes mainly weaving and knitting, rose from 225 million metres in 1967 to 1,247 million metres in 1976/77. This is indicative of the magnitude of growth in the weaving industry since 1967.
in the government's strategy of promoting import-substituting industrial growth, although it has developed behind a very high tariff wall. Accompanying this rapid expansion has been an extensive transformation of the structure of the industry, the technology it employs, and the composition of its output. Before 1966 the power loom sector was relatively small, its technology simple, and only a small number of fully-automatic looms were in operation. Since then however, this sector has expanded and modernised, and the importance of the once-dominant hand loom sector has declined sharply.

The decline in the hand loom sector has been hastened by changes in the type of cloth produced, which have resulted from a switch in consumer preferences. Two changes have been particularly important. First, western-style garments such as trousers and shirts have been replacing traditional clothing such as sarung, selendang, lurik and stagen. This trend is especially evident in urban areas and amongst the younger generation. It has had a harmful effect on hand loom firms because they are better suited technologically to the production of much of the traditional cloth, particularly the narrow width varieties. As we saw in Chapter Two, the development of a mass consumption market for modern textiles leads to the demise of traditional technology. The second change has been the switch from cotton to synthetic and cotton-synthetic blended cloths. Prior to 1966, the industry produced cotton cloth almost exclusively, but synthetics are now making rapid inroads into the market. During Repelita II (1974/75 - 1978/79) their share of total yarn consumption rose from 28 percent to an estimated 40 percent (Indonesia. Direktorat Jenderal Industri Tekstil, 1978:8). The increased use of synthetic fibres has adversely affected the hand loom sector because it is more difficult to achieve a uniform density with hand-woven synthetic cloth, and such fibre requires sophisticated dyeing equipment.²

² Cotton yarn may be hand-dyed but synthetic yarn requires higher temperatures and thus a mechanised dyeing unit. Hand loom firms wishing to produce synthetic cloth must either purchase the yarn pre-dyed or send it to a dyeing factory
The reasons for the industry's growth and transformation have already been alluded to. The investment climate improved dramatically as the New Order Government succeeded in reducing inflation and pledged itself to economic development. The system of yarn distribution, in virtual chaos after 1964, was formally abandoned in January 1967, and distribution channels were liberalised. In 1967 and 1968 the foreign and domestic investment regulations were introduced, offering a wide range of fiscal incentives. Also the state commercial banks were mobilised to provide industrial finance. Improved economic conditions, rapidly rising real incomes and the low cloth output of the mid 1960s all combined to produce the enormous expansion in the industry.

4.3 The Power Loom Sector

The rapid expansion in the power loom sector can be seen from the following statistics on capacity. In 1966, over 20,000 power looms were licensed (Table 3.3), while by 1969 about 27,000 were reported to be in existence, of which approximately 22,000 were in use (Boucherie, 1969:56). In 1976, total loomage was over 61,000. Hence in the space of just seven years the sector's effective capacity almost trebled. The Department of Industry now conducts regular censuses of power loom firms, and the information obtained gives a good general overview of this sector. Table 4.2 presents data regarding loomage by region and ownership. Despite recent rapid growth,

2 (continued)

before weaving. Either results in a significant increase in working capital requirements, the former because pre-dyed yarn must be purchased in very large quantities (by small firm standards), the latter because of the extra time necessary between purchase of inputs and sale of output.

3 Of course, one of the fundamental themes of this thesis is that the particular form of many of these policies has encouraged the adoption of excessively capital-intensive techniques. This issue is taken up in later chapters.
Table 4.2: Number of Power Looms and Average Firm Size by Region and Ownership, 1976

<table>
<thead>
<tr>
<th>Region</th>
<th>Domestic total number of looms</th>
<th>Domestic average per firm</th>
<th>Foreign total number of looms</th>
<th>Foreign average per firm</th>
<th>Government total number of looms</th>
<th>Government average per firm</th>
<th>Co-operative total number of looms</th>
<th>Co-operative average per firm</th>
<th>Total number of looms</th>
<th>Total average per firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jakarta</td>
<td>1,755</td>
<td>88</td>
<td>1,641</td>
<td>328</td>
<td>520</td>
<td>520</td>
<td>50</td>
<td>50</td>
<td>3,966</td>
<td>147</td>
</tr>
<tr>
<td>West Java</td>
<td>30,024</td>
<td>62</td>
<td>2,382</td>
<td>298</td>
<td>1,267</td>
<td>634</td>
<td>486</td>
<td>97</td>
<td>34,159</td>
<td>68</td>
</tr>
<tr>
<td>Central Java</td>
<td>8,606</td>
<td>73</td>
<td>1,612</td>
<td>806</td>
<td>1,695</td>
<td>424</td>
<td>1,682</td>
<td>120</td>
<td>13,595</td>
<td>138</td>
</tr>
<tr>
<td>Yogyakarta</td>
<td>877</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,088</td>
<td>181</td>
<td>1,965</td>
<td>103</td>
</tr>
<tr>
<td>East Java</td>
<td>3,082</td>
<td>91</td>
<td>1,428</td>
<td>476</td>
<td>803</td>
<td>201</td>
<td>444</td>
<td>148</td>
<td>5,757</td>
<td>131</td>
</tr>
<tr>
<td>Outer Islands</td>
<td>1,743</td>
<td>41</td>
<td>0</td>
<td>0</td>
<td>163</td>
<td>54</td>
<td>5</td>
<td>5</td>
<td>1,911</td>
<td>47</td>
</tr>
<tr>
<td>Indonesia</td>
<td>46,087</td>
<td>65</td>
<td>7,063</td>
<td>392</td>
<td>4,448</td>
<td>318</td>
<td>3,755</td>
<td>125</td>
<td>61,353</td>
<td>79</td>
</tr>
</tbody>
</table>

Source: Compiled from list of firms in Indonesia. Direktorat Jenderal Industri Tekstil, 1976a

Notes: a refers to total number of looms of firms in each group
b refers to average number of looms per firm
small-scale weaving is still very important, and the average number of looms per firm is relatively small - 79 for all firms, and 65 for private domestic firms. As in the past, the sector is overwhelmingly Java-based. Only 1,911 looms (three percent of the total) were located outside Java, mostly around the city of Medan (North Sumatra). These mills are on average smaller than those on Java. Within Java, West Java continued to be the major weaving province, with over half the power looms, followed by Central and East Java.

4.3.1 Ownership

There are considerable differences between the four ownership groups in the industry with regard to size and location. By far the largest in terms of looms per firm are the foreign-owned mills. By 1976 18 such mills were operating 7,063 looms. These mills have all been established since 1969 when the government, in seeking to assure foreign investors of their importance in the industry's future, embarked on a joint venture with Japanese investors to establish a large mill near Bandung (PT KTSM). The largest foreign investor has been Japan, and Japanese companies have been the major partner in over half the foreign mills in Indonesia. Indeed, despite the import-substituting nature of the industry and the fact that foreign investment recommenced only in 1969, by 1978 Indonesia had become the largest recipient country of Japanese foreign investment in textiles. A recent Japanese study attributed this to the very liberal foreign investment laws, the large domestic market, and the undeveloped state of industry in the mid 1960s (Yoshihara, 1978:109-111). Although no estimates are available for the share of output of foreign mills, it is misleading to assert - as some critics of the government do - that these firms dominate the industry. Certainly they are a very significant

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4 Average loomage for the foreign firms would be higher still but for some spinning mills having small weaving sections, and the presence of smaller mills making specialist products (eg. canvas).
and innovative group, but they probably produce no more than about 15 percent of the industry's output.  

Government-owned mills include a variety of firms with regard to size, technology and performance. In terms of average loomage they are the second largest group, but much of their capacity is very old, some dating back to the 1930s and 1940s. Like the industry as a whole, most of the capacity is located on Java. However, the largest single province is Central Java, with almost 40 percent of State-owned looms. There are three main types of Government weaving mills. The first and largest consists of those established before independence by Dutch firms, later taken over by the Indonesian government, and subsequently passed on to the provincial governments for management. This group includes the huge factories at Tegal (Central Java) and Garut (West Java) each with over 1,000 looms. The ownership and management of these firms have changed frequently. For example, Texin (Tegal) was established in 1936 by the Netherlands East Indies government. During the 1940s it changed hands no fewer than five times. A further change occurred in 1965 when it was transferred from the central to the provincial government. The other two categories of firms are much less important. They consist of those plants under the control of the huge government textile conglomerate PN Industri Sandang, and several plants set up by the Indonesian government in the 1950s and now run by provincial governments (for a discussion of the economic performance of government mills, see Appendix 5.2).

The third largest group in terms of average loomage but the smallest in terms of total loomage is the co-operative mills.

5 Their maximum output would be about 165 million metres per year (ie, 7,063 looms x 25 metres per shift x 3 shifts x 6 days x 52 weeks), or 19 percent of the industry's 1975/76 output. Allowing for sub-optimal performers (at least two foreign firms were experiencing difficulties during fieldwork in 1977/78), a more likely figure is 15 percent.
These are a *pribumi* stronghold in the industry, which have been established to supply independent *batik* firms with cambric. Co-operative mills have been established in all major batik centres, and thus these mills are located mainly in Central Java and Yogyakarta. They dominate the weaving industry in Yogyakarta (55 percent of its looms), in particular, owing to the presence of the large GKBI (Indonesian Batik Producers' Association) mill north of the city.

The final group is the *domestically-owned private mills*. This is by far the largest in the power loom sector, although these firms are on average the smallest. More than any other group, they are located in West Java, which has almost two-thirds the group's total loomage. Some important changes which have occurred within this group over the last decade—particularly the growing dominance of non-*pribumi* firms—will be discussed below.

### 4.3.2 Technological Dualism?

Frequently industrial development in LDCs is characterised as being dualistic, in the sense of a modern capital-intensive sector coexisting with a traditional labour-intensive sector. At either extreme of the Indonesian weaving industry there are such firms. Yet in terms both of firm size and technology in use it is more accurate to see the industry in terms of a continuum over a wide spectrum. Within the power loom sector firms range across this spectrum, from large modern plants to tiny family units more akin to handloom firms. Two facts dispel the notion of technological dualism. First, in terms of the number of looms, there are firms of almost every conceivable size in the industry, as the data in Table 4.3 indicate. For the dualistic model to apply, there would have

---

6 Traditionally, the major batik centres have been Solo, Pekalongan (Central Java), Yogyakarta, and, to a lesser extent, Tasikmalaya (West Java) and Ponorogo (East Java). Each of these cities has at least one co-operative mill producing grey cloth.
Table 4.3: Number of Power Loom Firms by Size of Firm, 1976

<table>
<thead>
<tr>
<th>Firm Size (number of looms)</th>
<th>0-49</th>
<th>50-99</th>
<th>100-199</th>
<th>200-499</th>
<th>500+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td>423</td>
<td>180</td>
<td>105</td>
<td>52</td>
<td>15</td>
<td>775</td>
</tr>
</tbody>
</table>

Source: As for Table 4.2

to be a bunching of firms into two groups - those with less than 50 looms (for example) and those with more than 500 (or 200) looms. Yet this is not the case.

A second, more important fact is that several industrial technologies exist within the power loom sector alone. In practice the classification of industrial technology is not easy, because textile machinery is produced in many countries and mill owners may make plant modifications after machinery is installed. If, in addition, for multi-phase industries such as weaving, technology is defined as a specific set of techniques for all phases, the number of possible 'technologies' would be very great. 7 For weaving itself, three main techniques exist in the power loom sector of the Indonesian industry. For the purposes of this thesis they are labelled as follows:

$M_1$: these are simple, non-automatic power looms, which have no automatic stop mechanism when the weft (cross thread) supply is exhausted. Thus they require constant operator attention and high labour: machine ratios. These looms are manufactured in Indonesia (now in limited quantities) and several other LDCs, including India and China.

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7 In addition to the weaving stage itself the term weaving usually encompasses four preparation and two finishing stages. Because there exist several techniques for each of these stages, clearly the number of possible combinations is considerable.
M₂: these are 'intermediate', semi-automatic looms, which have an automatic stopping mechanism when the weft is exhausted and hence require less direct labour supervision. They are manufactured in several semi-developed and developed countries including, in Asia, Japan, India, China, South Korea and Taiwan.

M₃: these are fully automatic looms, in which the weft supply is automatically replenished as it exhausts, thus requiring still less direct labour supervision. They are manufactured in many developed and several semi-developed countries.

There is in addition a still more capital-intensive technique, the shuttleless loom, which is used in developed countries. However, it has been introduced into Indonesia only on a very limited scale.

Unfortunately no data exist regarding the relative importance of each of these techniques, but they are to be found in most major weaving centres.

4.3.3 Which Firms Have Benefited From the Expansion Since 1966?

Which groups of firms and investors have benefited from the rapid growth of the power loom sector after 1966? Tentative answers to these questions may be found in Capital Investment Board (BKPM) approvals and Department of Industry registrations. Table 4.4 provides data for firms which have been granted investment incentives and commenced operation by 1978. A clear picture emerges of non-pribumi and foreign domination of the industry. Allowing for the fact that most of the firms of mixed ownership are effectively non-pribumi owned (the so-called 'Ali-Baba' operations), and some of the pribumi firms would be rented to non-pribumi managers, it can be concluded that non-pribumi investors have generated almost 60 percent of the growth of this sector of the industry. Foreign firms have accounted for another 30 percent. Thus pribumi participation - whether by
Table 4.4: Investment Approvals for Weaving Firms Operating by 1978, According to Ownership

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Number of Looms</th>
<th>(%)</th>
<th>Number of Firms</th>
<th>Looms/Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign</td>
<td>14,064</td>
<td>(29)</td>
<td>27</td>
<td>521</td>
</tr>
<tr>
<td>Domestic:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-pribumi</td>
<td>23,190</td>
<td>(48)</td>
<td>88</td>
<td>264</td>
</tr>
<tr>
<td>Mixed</td>
<td>5,075</td>
<td>(11)</td>
<td>16</td>
<td>317</td>
</tr>
<tr>
<td>Pribumi</td>
<td>2,911</td>
<td>(6)</td>
<td>13</td>
<td>224</td>
</tr>
<tr>
<td>Co-operative</td>
<td>1,986</td>
<td>(4)</td>
<td>15</td>
<td>132</td>
</tr>
<tr>
<td>Government</td>
<td>1,330</td>
<td>(3)</td>
<td>4</td>
<td>330</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48,556</strong></td>
<td><strong>100(^a)</strong></td>
<td><strong>167</strong></td>
<td><strong>291</strong></td>
</tr>
</tbody>
</table>

Source: Compiled from list of firms contained in Indonesia Departemen Perindustrian, 1978.

Note: a does not add due to rounding error

government, co-operative or private investors - has contributed merely one-tenth. This is very small for an industry which was traditionally regarded as an important area of pribumi business activity.\(^8\)

These data apply only to firms receiving BKPM incentives, and thus exclude most of the smaller firms (see Chapter Five, section 5.4). There does appear to have been some growth in the latter, hence the non-pribumi/foreign domination may apply just to the larger firms (which, however, own most of the industry's capacity). Table 4.5 presents data for power loom firms according to their size and the period in which they were established (before or after 1967). As would be

\(^8\) Note that whilst the data in Table 4.4 refer to firms which have already commenced operation, the growth in productive capacity is overstated because firms do not necessarily install all capacity which has been approved. Nevertheless, there is no reason to presume that any one group of firms lags in the installation of approved capacity.
Table 4.5: Power Loom Firms by Size of Firm and Date of Establishment, 1976

<table>
<thead>
<tr>
<th>Firm Size (number of looms)</th>
<th>0-49</th>
<th>50-99</th>
<th>100-199</th>
<th>200-499</th>
<th>500+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms Established:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) before 1967</td>
<td>211</td>
<td>85</td>
<td>40</td>
<td>15</td>
<td>0</td>
<td>351</td>
</tr>
<tr>
<td>(ii) 1967 and after</td>
<td>149</td>
<td>65</td>
<td>43</td>
<td>20</td>
<td>15</td>
<td>292</td>
</tr>
<tr>
<td>1967 and after Firms as Percentage of Total</td>
<td>42</td>
<td>43</td>
<td>52</td>
<td>57</td>
<td>100</td>
<td>45</td>
</tr>
<tr>
<td>No Date Given</td>
<td>63</td>
<td>30</td>
<td>22</td>
<td>17</td>
<td>0</td>
<td>132</td>
</tr>
<tr>
<td>Total</td>
<td>423</td>
<td>180</td>
<td>105</td>
<td>52</td>
<td>15</td>
<td>775</td>
</tr>
</tbody>
</table>

Source: As for Table 4.2

expected, there is a direct relationship between firm size and the percentage of firms in each size group which were established on or after 1967. Nevertheless, over 40 percent of the smaller firms (defined as those with less than 100 looms) began after 1967, which is indicative of some expansion amongst this group of firms also. The contrast in power loom firms is well shown in plates 4.1 and 4.2.

4.4 The Hand Loom Sector

If the new order period can be described as the 'golden era' (zaman keemasan) for the power loom sector then, equally, for hand looms it has been the first period since the 1930s that they have experienced a major reversal. Whilst still important, hand loom weaving is in a state of irreversible decline. The quiet life of the orde lama, with guaranteed markets and cheap inputs (for the well-connected), has given way to intense competition from the power loom sector. The government has paid little attention to hand looms. For many
Mechanised Weaving

Plate 4.1: Modern mechanised mill, fully-automatic looms (Pekalongan)

Plate 4.2: Medium scale mechanised mill, semi-automatic looms (Bandung)
years a UNIDO project to assist the small-scale textile industry focused only on small power loom firms. 9

Lack of government interest has been reflected in a paucity of statistics about the hand loom sector. Registered loomage still bears little relationship to looms in use. However, in contrast to the orde lama period when loomage was inflated to obtain lucrative yarn quotas, after 1966 the overstatement merely reflects a tardiness on the part of the government in updating its industrial statistics. It was not until 1975 that the Department of Industry undertook a comprehensive survey of the sector's productive capacity, thus giving a reasonably accurate picture of the number of hand looms in use for the first time in 20 years (see Table 4.6). 10

According to this survey, over 65,000 ATBMs were still in use. The degree of overstatement in registered loomage is clearly evident: just a little over one-third of the registered looms were actually in use, whilst only 30 percent of registered firms were still operating. For some regions, actual data are less than one-fifth of registered data. The difference between registered and actual totals also provides some indication of the rapidity of the decline in recent years among the major regions. For example, our impression from discussions with local officials during fieldwork was that the hand loom sector had declined very quickly in West Java. The data support this

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9 In fact, in his 1971 Address of State, President Suharto observed that 'Developments in the textile industry indicate that progress will be achieved only by those firms which use machinery as a means of production' (Indonesia. Departemen Penerangan, 1971:348). This view was put more forcefully by a leading Indonesian economist and sometime Minister, Dr Emil Salim who, in a conversation with Perteksi officials in the late 1960s, was reported to observe that hand looms might just as well be burnt (lebih baik dibakar saja).

10 Data were collected for improved hand looms (ATBMs) only, and excluded the gedogan. Departmental officials felt that the results for Java are more reliable than those for the Outer Islands. No explanation is given regarding what actually constitutes in use and thus the data probably include looms which are not in full-time use.
### Table 4.6: Registered and Actual Hand Looms, 1975

<table>
<thead>
<tr>
<th>Region</th>
<th>Firms</th>
<th></th>
<th>Looms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Registered&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Actual</td>
<td>Actual as % of Registered</td>
<td>Registered&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>West Java</td>
<td>10,945</td>
<td>1,187</td>
<td>11</td>
<td>55,637</td>
</tr>
<tr>
<td>Central Java</td>
<td>4,058</td>
<td>2,866</td>
<td>71</td>
<td>72,708</td>
</tr>
<tr>
<td>Yogyakarta</td>
<td>393</td>
<td>253</td>
<td>64</td>
<td>7,477</td>
</tr>
<tr>
<td>East Java</td>
<td>345</td>
<td>325</td>
<td>94</td>
<td>19,913</td>
</tr>
<tr>
<td>Total Java</td>
<td>15,741</td>
<td>4,631</td>
<td>30</td>
<td>155,535</td>
</tr>
<tr>
<td>Sumatra</td>
<td>299</td>
<td>84</td>
<td>28</td>
<td>7,626</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>631</td>
<td>247</td>
<td>39</td>
<td>15,765</td>
</tr>
<tr>
<td>Bali</td>
<td>76</td>
<td>64</td>
<td>84</td>
<td>1,889</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>8</td>
<td>38</td>
<td>801</td>
</tr>
<tr>
<td>Total Outer Islands</td>
<td>1,027</td>
<td>403</td>
<td>39</td>
<td>26,081</td>
</tr>
<tr>
<td>Total Indonesia</td>
<td>16,768</td>
<td>5,034</td>
<td>30</td>
<td>181,616</td>
</tr>
</tbody>
</table>

Source: Indonesia. Direktorat Jenderal Industri Tekstil, 1976b

Note: a "Registered" refers to
(i) for Java, registrations with the provincial offices of the Department of Industry in 1975;
(ii) for outside Java, registrations with the Directorate-General of the Textile Industry (Jakarta) in 1971.
because actual figures as a percentage of registered figures are the lowest for this province. By contrast, the recent growth of the industry in Bali is verified by the fact that total looms in use exceed the registered number - the industry there is growing faster than the local department can update its statistics. (Regional developments are discussed below in section 4.9.)

The hand loom industry is predominantly located on Java (86 percent of looms, 92 percent of firms), although it is less Java-based than the power loom sector. Central Java is the most important hand weaving province, containing half the number of hand looms in use. Even East Java has more hand looms in use than the once dominant province of West Java.

Because no reliable figures for the sector's effective capacity in the mid 1960s exist, it is difficult to estimate precisely the magnitude of the decline since then. Boucherie (1969:61) suggested that about 125,000 hand looms were in operation in 1968, hence over the period 1968-1975 the sector declined by almost one-half (125,000 to 66,000 looms). During fieldwork (1977-1978) local officials in the hand weaving centres estimated the industry was 25-30 percent of its size before 1966 in Central Java, and still smaller in West Java. This is broadly consistent with a halving of the industry between 1968 and 1975. Despite the industry's decline, there still exist many large hand loom firms employing 50 or more workers. Moreover, not all hand loom firms have followed the general decline of this sector. Many firms producing high quality cloth - much of it for the tourist market - or cloth not produced by the power loom sector in any quantity are prospering. Other firms whose owners have adopted aggressive marketing policies are surviving (see Appendix 4.3).

A ubiquitous phenomenon of hand loom weaving is seasonality, with regard to both demand for cloth and supply of labour. The textile market in Indonesia is very seasonal. Demand reaches a
peak during **Idul Fitri**, the period which celebrates the completion of the Moslem fasting month. Low income earners may purchase cloth only once a year and, because the handloom sector (with the exception of the handicraft goods) tends to cater for this group, demand for its cloth is more seasonal than that of the power loom sector. Similarly, the supply of labour to handloom firms fluctuates more than that of the power loom sector, because they usually recruit rural labour whose work patterns are attuned to the agricultural cycle. In Java during 1977, these two seasonal influences may be represented approximately by the following rough schema:

Figure 4.1: Diagrammatic Representation of Seasonal Influences on the Hand Loom Sector, 1977

Plates 4.3 and 4.4 show typical handloom operations.
Hand Loom Weaving

Plate 4.3: Hand loom weaver producing sarung (rural Jepara)

Plate 4.4: Cottage hand loom unit (rural Pekalongan)
4.5 Cottage Weaving

The 1974 Industrial Census provides the first detailed information on one component of the handloom industry, the cottage weaving sector. Data on these units were collected over the 12 month period August 1974 to July 1975, and are thus presumably free from the seasonal bias which usually characterises information about cottage industry. Units included were those hiring less than five persons and selling at least part of their output.

Several interesting conclusions emerge from a summary of the Census data presented in Table 4.7. In contrast to the weaving industry as a whole most cottage weaving is located in the Outer Islands. One province, South Sulawesi, accounts for over half the sector's 'employment' (Column 9). Indeed, less than one-third of cottage weaving is on Java, primarily in Central Java and Yogyakarta. Also, weaving is a very minor component of total cottage industry on Java, whereas in some provinces of the Outer Islands (East Nusa Tenggara and Southeast Sulawesi) it constitutes over half of cottage sector employment (Column 8).

Three further characteristics of household weaving emerge from these data. First, hired labour is not widely used by cottage weavers, providing less than 10 percent of total labour input. In the Outer Islands it is virtually non-existent. It is more important on Java, presumably reflecting the greater commercialisation of the industry there. Secondly, cottage weaving is a seasonal, part-time activity, and much of the labour would be engaged in other economic activity during the year. This can be seen by comparing the number of participants (Column 4) with the number of full-time equivalent 'jobs' (Column 9) — the former is about three times the latter. Thirdly, the data suggest that most cottage weavers in the Outer Islands are using the backstrap loom (gedogan) rather than the ATBM. Full-time equivalent cottage weaving employment in the Outer Islands is almost 26,000 (Column 9). However, the Department of Industry survey found that 9,514 ATBMs were
### Table 4.7: Cottage Weaving Activity by Region, 1974/75

<table>
<thead>
<tr>
<th>Region</th>
<th>No. Units</th>
<th>No. Participants</th>
<th>Man Days ('000)</th>
<th>Weaving As % of Total Cottage Activity</th>
<th>No. 'Jobs'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hired Householder</td>
<td>Total</td>
<td>Hired Household Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Java</td>
<td>218</td>
<td>207</td>
<td>672</td>
<td>879</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>120</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>480</td>
</tr>
<tr>
<td>Central Java</td>
<td>5,987</td>
<td>2,552</td>
<td>17,773</td>
<td>20,325</td>
<td>696</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,867</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,563</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10,052</td>
</tr>
<tr>
<td>Yogyakarta</td>
<td>2,334</td>
<td>135</td>
<td>7,185</td>
<td>7,320</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>425</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>467</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,868</td>
</tr>
<tr>
<td>Sumatra</td>
<td>1,401</td>
<td>106</td>
<td>4,228</td>
<td>4,334</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>393</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>419</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.9(^c)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,676</td>
</tr>
<tr>
<td>Bali and Nusa Tenggara</td>
<td>3,546</td>
<td>43</td>
<td>9,631</td>
<td>9,674</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>471</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>484</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.8(^d)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,936</td>
</tr>
<tr>
<td>Southeast Sulawesi</td>
<td>22,368</td>
<td>242</td>
<td>66,660</td>
<td>66,902</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5,352</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>5,426</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21,704</td>
</tr>
<tr>
<td>South Sulawesi</td>
<td>605</td>
<td>0</td>
<td>1,828</td>
<td>1,828</td>
<td>0</td>
</tr>
<tr>
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</tr>
<tr>
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<td>122</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50.6</td>
</tr>
<tr>
<td>Indonesia(^e)</td>
<td>36,459</td>
<td>3,285</td>
<td>107,977</td>
<td>111,262</td>
<td>912</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8,689</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9,601</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38,404(^f)</td>
</tr>
</tbody>
</table>


Notes:
- a That is, total man days in weaving as a percentage of total man days in all cottage activity
- b Estimated by assuming one 'job' is equivalent to 250 man days per year
- c The percentage of total man days in cottage activity only for the two provinces in which cottage weaving is found (North Sumatra and West Sumatra)
- d Note that the figure for East Nusa Tenggara is 59.4 percent
- e No cottage weaving was recorded for the remaining regions
- f Does not add due to rounding
operating in the Outer Islands in 1975 (Table 4.6). Using the Department's labour : hand loom ratio of 1.5:1, this suggests ATBM employment was a little over 14,000 - and this is for firms of all size. Thus, well over half the cottage weavers in the Outer Islands must be using the gedogan, which is a good indication of the traditional nature of much of the industry.

What are the prospects for cottage weaving in Indonesia? Household weaving frequently is seen as an important means of generating counter-seasonal employment and income opportunities in densely-populated rural economies such as Java. This is particularly so because used hand looms can be obtained very cheaply, and weaving techniques are familiar to many. Yet in 1974 weaving constituted less than one percent of total cottage industry in Java. Whilst it may have expanded since then, it would still be insignificant. There are several explanations for its unimportance. The seasonality of the demand for textiles is such that cottage weaving is profitable only during the months immediately prior to Idul Fitri, when quick sales are assured. And because the Moslem fasting month rotates during the year, the busy textile period may not necessarily coincide with a slack agricultural period when abundant labour is available.

More importantly, hand loom weaving differs from most other cottage activities in that all its non-labour inputs are obtained from the modern manufacturing sector. In the traditional model of cottage industry (and peasant agriculture) household enterprises are seen as competitive with larger factories partly because of their ability to economise on the need for working capital, in the Ricardian sense of wages not being advanced until the product is sold (Sen, 1975b:70). However, for hand loom weavers, who use purchased yarn, wages advanced constitute a very small proportion of total working capital. Hence, the use of household labour results in only

---

11 For example, the price of 1 pak (4.5 kgs) of yarn is equivalent to about 20 to 30 days wages of a hand loom weaver.
a minimal reduction in working capital. Moreover, rural cottage units using modern sector inputs are likely to generate a value added per unit of output which is significantly below that of larger firms using the same technology. Transport costs can be considerable for small orders to remote villages, pecuniary diseconomies of scale will be associated with such orders, and the selling price may be lower if the producer lacks a knowledge of market conditions.\textsuperscript{12} By contrast, cottage weaving in the Outer Islands suffers from none of these disadvantages because in most areas it does not face competition from commercial weaving firms.

For all these reasons, cottage weaving is unlikely to become important on Java in the immediate future. Indeed, it is only likely to expand if there is a switch away from weaving cotton and synthetic cloth to products which do not require modern sector inputs. The best prospect is bamboo weaving, with which some weavers are experimenting already.

4.6 Trends in Employment

Of all facets of the weaving industry, employment trends are perhaps the most puzzling - and the most contentious. At one extreme an ILO report (1973:65), using uncited material, claimed that:

During the period 1966 to 1971, when production rose from 260 to 600 million metres, the industry as a whole lost half of its workforce. The hand loom and batik sectors lost all but 100,000 of their 510,000 workers who had been previously employed there.

In Chapter Two it was pointed out that, given the relatively undeveloped state of the industry before 1966, the rapid introduction of modern technology and the decline of the hand loom sector might well result in minimal employment growth. However, it is scarcely conceivable that output could have

\textsuperscript{12} These points are well made by Reddaway (1962:74-75) in discussing the cottage textile industry in rural India.
increased several-fold and employment halved. All available evidence suggests the most likely conclusion is that employment has been fairly stable or increased slightly.

Table 4.8 provides an estimate of factory employment in the industry in 1963 and 1974/75. This suggests a decline in employment, although little reliance can be placed on the 1963 estimate for hand loom employment. There are serious doubts regarding the accuracy of the 1964 Industrial Census and, in any case, weaving was not separated out from textiles. Additional employment data are provided by the annual Statistik Industri, which in recent years has included all large and medium manufacturing firms in its enumeration (Table 4.9). It is not possible to obtain a continuous series of consistent estimates for the period owing to the change in definition of firm size in 1974. The data suggest a quite rapid increase in employment in the early 1970s (particularly 1971-72), but after 1974 the picture is not clear. Within each period (1970-73, 1974-77), the number of firms fluctuates considerably from year to year, which may partly explain some of the big changes (e.g. 1974-75, 1975-76). Overall, it can be concluded that employment in large and medium weaving firms has risen -
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Employment</th>
<th>Number of Firms</th>
<th>Employees/Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>108,688</td>
<td>3,058</td>
<td>36</td>
</tr>
<tr>
<td>1971</td>
<td>112,243</td>
<td>2,620</td>
<td>43</td>
</tr>
<tr>
<td>1972</td>
<td>159,403</td>
<td>2,825</td>
<td>56</td>
</tr>
<tr>
<td>1973</td>
<td>153,620</td>
<td>2,708</td>
<td>57</td>
</tr>
<tr>
<td>1974</td>
<td>100,483</td>
<td>1,216</td>
<td>87</td>
</tr>
<tr>
<td>1975</td>
<td>149,021</td>
<td>1,787</td>
<td>83</td>
</tr>
<tr>
<td>1976</td>
<td>120,232</td>
<td>1,338</td>
<td>90</td>
</tr>
<tr>
<td>1977</td>
<td>114,975</td>
<td>1,192</td>
<td>97</td>
</tr>
</tbody>
</table>

Source: Indonesia. Biro Pusat Statistik, Statistik Industri, annual

hardly a surprising finding because it is this sector of the industry which has been expanding. But the extent of the increase is unclear.\textsuperscript{13} No information is available regarding employment trends in the small-scale and cottage sectors.

A final estimate of employment changes can be obtained by making various assumptions regarding the output of firms using each of the four main weaving techniques, and using the labour-use coefficients obtained during fieldwork. Although estimates obtained by this method are approximate, they are a useful means of checking the census employment data, particularly because of the uncertainty regarding the 1963 figures. The procedure is as follows: based on estimates of weaving output for the census years (precise output figures for each year are not known), several plausible 'output mixes' for the four techniques are assumed for each year. Average labour-use ratios for each technique are then multiplied by the assumed output for the relevant technique. These are summed to give a range of estimates of total labour hours, and hence 'job equivalents', for the two years.

Table 4.10 presents an estimate of labour hours required

\begin{table}[h]
\centering
\begin{tabular}{l|c|c|c|c}
\hline
Technique & H & $M_1$ & $M_2^a$ & $M_3^a$ \\
\hline
Ordinary & 1,950.6 & 676.4 & 494.1 & 82.8 \\
Handicraft & 3,356.3 & & & \\
\hline
\end{tabular}
\caption{Labour Hours per 1,000 m$^2$ Production by Technique}
\end{table}

Source: Field Research
Note: a excludes government firms

\textsuperscript{13} The Statistik Industri data are analysed in detail by McCawley and Tait, 1979a.
to produce 1,000 m² of cloth for each technique. Two estimates are provided for hand looms because of the substantial difference in labour input between traditional types of cloth and what is labelled 'handicraft' cloth (i.e. cloth of intricate design). The range in terms of labour input (or the physical productivity of labour) is considerable. Hand loom firms producing handicraft cloth require more than 40 times the number of labour hours for a given quantity of output compared to fully-automatic looms in privately owned firms. There is some difficulty regarding production data for the two years. Because the 1974/75 figure is not known, the average of 1973/74 and 1975/76 is taken (823 million metres). For 1963, the position is more complex. Two sets of data for the years 1961 to 1964 are available (see Table 3.3), and output fluctuated considerably (e.g. between 1963 and 1964 it halved). It is unlikely that employment figures would have fluctuated as much, thus output for 1963 is assumed to be an average of the years 1963 and 1964 (202.45 million metres).

Because the composition of output between techniques is not known, several plausible combinations are specified for each year. These are shown in Table 4.11 (columns (1) - (5)). Total labour hours in producing annual output for each of the eight cases are shown in column (6). These are the sum of labour hours expended for each technique, which are calculated by multiplying the relevant technique's labour-use figure in Table 4.10 by its assumed output.¹⁴ Finally, total labour hours are converted to total 'jobs' (column (7)) by dividing by 2,000.

Several of the 16 estimates of employment change in the industry may be discarded because they suggest either a rise

¹⁴ Note that our labour-use data are in terms of square metres, whereas production data refer to length. However the difference has little effect on the results.
### Table 4.11: Alternative Estimates of Employment in the Weaving Industry, 1963 and 1974/75

<table>
<thead>
<tr>
<th>Case</th>
<th>M3 (%)</th>
<th>M2 (%)</th>
<th>M1 (%)</th>
<th>Ordinary (%)</th>
<th>Handicraft (%)</th>
<th>Total Labour Hours ('000)</th>
<th>Total Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1963)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>40</td>
<td>15</td>
<td>35</td>
<td>0</td>
<td>200,439.7</td>
<td>100,220</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>30</td>
<td>15</td>
<td>45</td>
<td>0</td>
<td>229,927.5</td>
<td>114,964</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>25</td>
<td>15</td>
<td>50</td>
<td>5</td>
<td>277,807.5</td>
<td>138,904</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>20</td>
<td>15</td>
<td>60</td>
<td>5</td>
<td>311,458.2</td>
<td>155,729</td>
</tr>
<tr>
<td>(1974/75)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>60</td>
<td>27</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>266,066.4</td>
<td>133,033</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>29</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>330,520.5</td>
<td>165,261</td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>31</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>394,974.6</td>
<td>197,487</td>
</tr>
<tr>
<td>8</td>
<td>45</td>
<td>33</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>459,428.6</td>
<td>229,714</td>
</tr>
</tbody>
</table>

Source: See text

Notes:
- a Calculated using labour-use ratios in Table 4.10, and assuming output for 1963 as 202.45 million metres, 1974/75 823 million metres.
- b Assuming one 'job' = 40 hours x 50 weeks = 2,000 hours/year. Hence, (7) = \( \frac{(6)}{2,000} \)

In handloom employment or only a small decline. The former includes five combinations (1-7, 1-8, 2-7, 2-8, 3-8), the latter four combinations (1-6, 2-6, 3-7, 4-8).

<table>
<thead>
<tr>
<th>Output Mix Assumption 1963</th>
<th>Decrease in Hand Loom Employment</th>
<th>Increase in Power Loom Employment</th>
<th>Net Change in Total Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 5</td>
<td>39,243</td>
<td>72,056</td>
<td>+32,813</td>
</tr>
<tr>
<td>2 5</td>
<td>58,988</td>
<td>77,057</td>
<td>+18,069</td>
</tr>
<tr>
<td>3 5</td>
<td>86,847</td>
<td>80,976</td>
<td>- 5,871</td>
</tr>
<tr>
<td>3 6</td>
<td>56,982</td>
<td>83,339</td>
<td>+26,357</td>
</tr>
<tr>
<td>4 5</td>
<td>105,592</td>
<td>82,896</td>
<td>-22,696</td>
</tr>
<tr>
<td>4 6</td>
<td>75,727</td>
<td>85,259</td>
<td>+ 9,532</td>
</tr>
<tr>
<td>4 7</td>
<td>45,863</td>
<td>87,621</td>
<td>+41,758</td>
</tr>
</tbody>
</table>

Source: Calculated from Table 4.11

42,000 jobs. Unfortunately, it is not possible to determine which of the seven estimates is likely to be the most accurate. However, owing to the fact that five suggest an increase, it seems reasonable to conclude that the most likely change was a modest increase in employment. The census data suggested a decline in employment between 1963 and 1974/75, but the 1963 estimate of hand loom employment was most likely an overestimate. Hence the two estimates of employment change are in general accord: despite the rapid growth in output, employment growth has been negligible. Nevertheless, the ILO estimate of a sharp decline in employment - even though it refers to a different period - is certainly wrong.16

Critics of Indonesia's post-1966 development strategy might take some satisfaction from these figures: output rose four-fold from 1963 to 1974/75, but employment rose little if

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16 This is not to suggest that there was no decline in weaving employment. Indeed, McCawley and Tait (1979b) persuasively argue that it may well have declined in the early years of the order baru when the government was pursuing a strongly deflationary policy, then increased as the economy began to expand.
at all. As we have emphasised above, part of the explanation for this is that the industry was in such an undeveloped state before 1966. When, finally, a period of rapid industrialisation commenced and the labour-intensive sector of the industry began to decline, it is not surprising that the sudden switch to more capital-intensive techniques did not generate a large net increase in employment.

Two additional observations may be made regarding employment changes in the industry. First, even though the net change has been minimal, jobs created in power loom factories are far superior to those lost in the hand loom sector. The former generally offer relatively well-paid, secure employment, in better working conditions and including some social security provisions. Advocates of labour-intensive techniques frequently overlook the poor conditions of work in small labour-intensive firms (see Chapter Seven). Secondly, the relative stability of employment over this period conceals changes in the nature of the industry's workforce, changes which have equity and distributional implications. Clearly, the group to have gained the additional jobs - younger, better-educated school graduates - does not correspond to that which has been displaced. The latter group (especially weavers in rural hand loom firms) may have become worse off as a result of these changes. This is one of the major problems associated with the rapid introduction of new technology in societies where institutions to support such displaced groups are deficient.  

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17 Franke (1972:137-139) provides an interesting 'view from the village' perspective on these problems. Observing that most textile factories in north Central Java have been established in and around the major coastal cities, he found that weavers previously working in hand loom firms further inland have been affected adversely by the changes. Moreover, the rigid hiring practices of the larger mills and the decline in hand loom weaving has affected workers engaged primarily in agriculture who depended on supplementary weaving activity for several months of the year.
4.7 The Structure of the Industry

An understanding of the structure of the weaving industry is necessary for the choice of technique analysis conducted in Chapters Nine and Ten below. Neoclassical analysis assumes the existence of profit-maximising (or cost-minimising) entrepreneurs. Whether this is an accurate description of their behaviour depends in large part upon the industrial structure. A competitive market environment forces firms to minimise costs in order to stay in business. In the words of one of the standard references in the field of industrial economics:

> Market structure is important because it determines the behaviour of firms in the industry, and that behaviour in turn determines the quality of the industry's performance (Caves, 1964:16).

What are the determinants of market structure? The four most important factors are seller (and buyer) concentration, product differentiation, barriers to entry of new firms, and the role of the government. It will be argued in this section that the structure of the industry may broadly be described as one of monopolistic competition. This conclusion regarding the competitive nature of the industry is crucial to the analytical framework employed in subsequent chapters.

4.7.1 Concentration

Concentration is a major determinant of market structure because it influences the scope for collusive behaviour. Although in practice there is no universal definition of seller concentration, Scherer (1973:60) suggests as a rule of thumb that if the four largest firms produce 40 percent of an industry's output, the likelihood of oligopolistic behaviour increases considerably. According to this rule, the weaving industry is characterised by low seller concentration: although production data are not publicly available, in 1977 the four largest firms would have produced less than 10 percent of the industry's output.
Care must be taken in using this definition of concentration. Even at the five-digit level of industrial classification the 'industry' may not be disaggregated sufficiently. As Scherer (1973:52) points out, two goods produced by a single industry may not necessarily be close substitutes. This argument is of some relevance for the weaving industry. For certain products - for example, canvas goods and high quality grey cloth (primissima) - there are few producers and the market structure for these 'sub industries' may be described as oligopolistic. Nevertheless for most product lines there are many producers, none of which has significant market power.

4.7.2 Product Differentiation

Firms aim for product differentiation because it makes consumer demand for their products less price elastic and thus alters the slope of the demand curve. It is important to distinguish between product differentiation, and differences in product quality which result from the use of different techniques of production. The latter are determined by technological factors, whereas the former more likely result from production - periphery activities (e.g. packaging) and sales promotion.

Both product differentiation and quality differences between techniques are relatively unimportant in the Indonesian weaving industry. Quality differences do exist, but they are less than those for almost any other major manufacturing industry. Product differentiation is not a major factor because many types of cloth are intermediate products. These include cambric, used for batik, plain and patterned cloth purchased by garment-makers, furniture coverings and other goods. Commercial buyers are less likely to be influenced by sales promotion (Caves, 1964:17-21), hence product differentiation is less important. For final products (e.g. sarung) it is more important. Nevertheless, brand names have not been established in the way they have in many other industries (e.g. the kretek cigarette industry).
4.7.3 Barriers to Entry

Barriers to entry are important because they determine the ease with which new entrants may challenge established firms in an industry. Three main factors determine the height of these barriers:

(i) Economies of Scale: If high levels of output lead to considerable reductions in unit costs, new entrants must either establish large-scale plants immediately, or compete against established firms which have a lower cost structure. Several studies have found however, that technical economies of scale are less important in the textile industry than in most other industries (see eg., Silbertson, 1972:382). Moreover, within textiles they are less important in weaving than either spinning or fibre making (Yoshihara, 1978:94-95). There appear to be two main reasons for this. First, there is not the 'lumpiness' problem which characterises many other industries. The basic production unit (a loom) is easily divisible. Aside from considerations such as co-ordination with other stages of production, maximum economies can be achieved with a relatively small plant. Secondly, the production process is non-continuous, hence to achieve maximum throughput it is not necessary to have a large plant.

(ii) Product Differentiation: If the products of established firms have significant consumer loyalty, entry is more difficult. However, it has been shown that product differentiation in the industry is relatively unimportant.

(iii) Absolute Costs: This item includes a range of factors which may result in the cost structure of new entrants being higher than that of established firms. There are several reasons for this - input prices could be high (especially if competitors are vertically-integrated), high research and
development expenditures may be necessary, or credit more expensive. Few of these factors are of special importance in the weaving industry, although fully-integrated textile plants may be in a slightly more competitive position owing to periodic yarn shortages.

4.7.4 The Role of the Government

The effect of government policy on the industry will be discussed in detail in Chapter Five. There are many ways in which governments may affect industrial structure, and for Indonesia these may be briefly summarised as follows: No restrictive trade practices legislation is in force such as exists in most western economies, but neither are patent laws. Government assistance to industry is directed primarily towards prihumi firms, in theory at least, and does not depend on the size of the firm. Certainly, there are no special benefits in remaining small as there are in India, for example (see Chapter Two). The greatest potential for Indonesian government influence over market structure is through its licensing regulations, because any firm wishing to receive government assistance (credit, taxation concessions, etc.) must be licensed. Recently, the government has closed parts of the textile industry to certain investors, thus constituting a case of 'blockaded entry'. The effects of this regulation are not yet clear, however: it may well have been a case of closing off areas to which investors were no longer attracted and, in any case, the regulations can be circumvented fairly easily.

4.8 Sub-Contracting in the Industry

In Chapter Two it was observed that there are two types of sub-contracting - commercial and industrial. Commercial sub-contracting in the weaving industry (maakloon) has been present for many years. It first began with the import of machine-spun yarn in the late nineteenth century, and flourished in the
1930s as factory weaving developed.\textsuperscript{17a} Usually it is adopted by small firms whose owners have difficulty obtaining working capital and lack access to established marketing channels. A trader or larger firm supplies yarn and other raw materials together with instructions regarding the type and quality of cloth to be produced. The weaver is paid to make the cloth, thus the term 'wage weaving' is often used. There are several variants of the system. For example, the weaver may be responsible only for weaving, or the preparation stages also; profit (after wages) may be in the form of surplus yarn rather than cash; either party may be responsible for the payment of taxes and levies. However the principle is always that the trader makes the commercial decisions. The weaver, who controls the production side, operates under what is virtually a contract weaving system. Maakloon is discussed further in the sections on Majalaya (4.9.1), the region in which it is predominantly found, and Chapter Six (section 6.6).

On the other hand, industrial sub-contracting in the industry is not very important. As noted in Chapter Two (section 2.5), weaving is not suited to industrial sub-contracting because the production process consists of relatively few distinct stages. Moreover, in the case of the Indonesian weaving industry, to the extent there is any putting out, it almost always takes the form of small firms placing orders with larger firms; that is, the reverse of the usual practice of large units sub-contracting to smaller ones (see Table 4.13). In our survey, over one-third of the smaller mechanised firms (techniques M\textsubscript{1} and M\textsubscript{2}) regularly put out one or more of their preparation or finishing stages to large firms (technique M\textsubscript{3}). Many of the smaller firms do not have

\textsuperscript{17a} Hiroshi (1970:36) reports the existence of maakloon in Majalaya in the 1930s. Sitsen (1942:23-25) documents the role played by bakul (small-scale traders) in the textile industry of Central Java during the same period.
Table 4.13: Industrial Sub-contracting in the Power Loom Sector

<table>
<thead>
<tr>
<th>Firms (Technique)</th>
<th>Number Receiving/ Placing Orders</th>
<th>Number in Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M_3$ firms receiving orders from $M_1$ and $M_2$ firms</td>
<td>4</td>
<td>10 ($M_3$ firms)</td>
</tr>
<tr>
<td>$M_2$ firms receiving orders from $M_2$ firms</td>
<td>1</td>
<td>23 ($M_2$ firms)</td>
</tr>
<tr>
<td>$M_2$ firms placing orders with $M_3$ firms</td>
<td>9</td>
<td>23 ($M_2$ firms)</td>
</tr>
<tr>
<td>$M_1$ firms placing orders with $M_3$ firms</td>
<td>4</td>
<td>9 ($M_1$ firms)</td>
</tr>
</tbody>
</table>

Source: Field research

the finance to purchase expensive dyeing, finishing or warping units. In fact, no examples were found in our survey which correspond to the traditional sub-contracting model of large firms putting out to small firms. This practice is virtually unheard of in the Indonesian weaving industry.

In recent years there has been increased discussion of the role sub-contracting can play in assisting small-scale industry in Indonesia. Repelita III (1979/80 - 1983/84) raises this issue, and asserts that small firms could benefit through 'product standardisation, technical and management guidance, and financial assistance' (Indonesia. Departemen Penerangan, 1979:18). Moreover, proposals have been advanced to make the extent of sub-contracting one of the conditions for large firms obtaining credit from state banks. It is to be hoped that, if such measures are to be widely adopted, it will be on an

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18 Some hand loom and small power loom firms do put out part of their preparation stages to rural household workers. However, this is not a widespread phenomenon. For rural firms there is little incentive to put out because savings in wages and fixed capital (in the form of buildings) are minimal.
industry-by-industry basis. For weaving, the largest employer of labour in manufacturing, this policy would be counter-productive. 19

4.9 Regional Developments

So far the broad indicators of changes within the industry have been considered. However, even within the power loom sector the pattern of growth has been by no means uniform. In order to understand the industry more fully, it is useful to contrast developments in various regional centres. In this section the history of the three traditionally important weaving towns, Majalaya, Pekalongan and Pedan, is considered briefly. (The location of major weaving centres visited during our survey is shown in Figure 4.2.)

4.9.1 Majalaya

Developments in the weaving industry at the regional level are best documented for Majalaya, the town located 30 kilometres southeast of the capital of West Java, Bandung. The industry there is interesting for two reasons. First, for many years it was the major weaving centre in the country, but during the orde baru it has declined in relative importance. Moreover hand loom weaving has disappeared more rapidly in Majalaya than any other major weaving centre. Secondly, the region provides a fascinating insight into the changing roles of the non-pribumi and pribumi groups in the weaving industry.

19 A more general consideration is why, apparently, industrial sub-contracting is so little practised in Indonesia. A tentative explanation might be first, the undeveloped nature of the industrial sector - the usual sub-contracting industries (machinery, machine parts, electronics) have yet to emerge on a wide scale; and secondly, the fact that the import-substituting foreign firms, which are important in the modern sector of manufacturing, may prefer to maintain a low public profile, and hence do not engage in putting out.
Figure 4.2: Weaving Centres Visited in Java and Bali
There has long been a textile industry in Majalaya, but a major boost came with the invention of the improved hand loom (ATBM) and its introduction to the town in the late 1920s. Developments received a further impetus with the connection of electricity in 1936 and the appearance of mechanised weaving shortly after. By 1939, licensed weaving capacity was 123,357 sarung per month, of which 40 percent was held by Chinese firms (Harahap, 1952:59). We noted above that the Japanese occupation and the subsequent independence struggle against the Dutch severely disrupted weaving in the town. One alleged effect was the movement of Chinese weavers out of the town to the security of Bandung. Nevertheless, the Chinese played an important role in the industry, owning more than one-third of total capacity in 1948 (Table 4.14). This is contrary to the view that they were involved initially in trade and only more recently have moved into manufacturing. Certainly their dominance of trade was almost complete, but their manufacturing role was also important.

The industry flourished after 1950. By the mid 1960s it is estimated that Majalaya produced about 40 percent of the country's output (Palmer, 1968:164). Over the period 1950-1967 licensed power loomage rose 15-fold (Indonesia. Dinas Perindustrian Propinsi Jawa Barat, 1975:1) and perhaps half of Indonesia's total hand loom output was produced in the town. Before 1965 the co-operatives played an important role in the

<table>
<thead>
<tr>
<th></th>
<th>Indonesian</th>
<th>Chinese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Power Looms</td>
<td>239</td>
<td>131</td>
<td>370</td>
</tr>
<tr>
<td>Number of Hand Looms</td>
<td>3051</td>
<td>1835</td>
<td>4886</td>
</tr>
</tbody>
</table>

Source: Hiroshi, 1970:35.
distribution system, but with the change in government maakloon quickly became important. One researcher working in the area in the late 1960s observed that

About 30 Chinese cotton brokers are operating in Majalaya. They control the supply of materials and the marketing channels under the system of wage-weaving, and thus the weaving industry itself in the region (Hiroshi, 1970:67).

During the orde baru, the power loom sector has expanded (licensed loomage rising from 5,580 in 1967 to 8,106 in 1974), but the town has lost its position as the country's major weaving centre. No large weaving mills have been established and the Capital Investment Board has approved only eight firms with a total of a little over 1,100 looms (Table 4.15) - less than three percent of loomage approvals for the country.

Table 4.15: Investment Board Approvals by Ownership, Majalaya and Pekalongan

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Pribumi</td>
<td></td>
</tr>
<tr>
<td>looms firms</td>
<td></td>
</tr>
<tr>
<td>Co-operative Pribumi</td>
<td></td>
</tr>
<tr>
<td>looms firms</td>
<td></td>
</tr>
<tr>
<td>Pribumi</td>
<td></td>
</tr>
<tr>
<td>looms firms</td>
<td></td>
</tr>
</tbody>
</table>

Source: As for Table 4.4

Note: a Data refer to firms receiving approval from the BKPM and operating by 1978. Loomage refers to the number approved, and therefore exceeds actual capacity.

b Pekalongan data exclude a very large foreign-owned mill - the largest in Indonesia - established at Batang, about 10 km east of the city.

as a whole since 1967. Clearly most of the growth has been in the smaller firms, many of which start by purchasing second-
hand looms. The relative decline of Majalaya is not altogether surprising. Before 1966 the town remained important because the industry had evolved there, and after 1957 licence-holders had little incentive to move elsewhere. Yet with the changes in the industry since 1966, there has been little in the town's 'textile infrastructure' to induce large firms to be established there rather near the large cities: marketing channels, machine supplies, and repair and credit facilities are all based in these cities, hence Majalaya has little to offer. Small firms continue to locate in the town because of the ready availability of textile workers. Large firms prefer to recruit better-educated, recent school graduates from the cities.

In contrast to the modest expansion in Majalaya's power loom sector, the hand loom sector has shrunk rapidly. One estimate put their number 'in operation' in 1975 at about 1,500 for the whole of kabupaten Bandung, whereas in the mid 1960s many thousands were in use in Majalaya alone (Indonesia. Dinas Perindustrian Propinsi Jawa Barat, 1975:5). There are several possible explanations of why hand looms have disappeared from use more quickly in Majalaya than other major centres. First, there is little demand for cotton sarung in West Java and, as noted above, small hand loom firms have difficulty weaving synthetic cloth. Secondly, real wages are higher than in Central Java, and this particularly affects labour-intensive activities such as hand loom weaving. Thirdly, pribumi owners are the only group engaged in hand loom weaving on a major scale, and pribumi entrepreneurship appears to be weaker in Majalaya than in parts of Central Java (see below). Fourthly, the market in West Java is well supplied by the many mills operating in the Bandung district. By contrast, there are no

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20 A survey of the town in 1973 found that 44 percent of power looms in use were more than 15 years old, and only seven percent were less than five years old (Eshuis et al., 1974:14).
large power loom factories producing sarung in Central Java. In addition, the growth of the batik industry in Central Java has provided at least a small market for handloom firms to produce low quality blaco.

The second major trend in Majalaya is the steady erosion of pribumi participation in the power loom sector. Before 1967 this group controlled over half the power loom capacity. By 1978 however, there were relatively few pribumi-owned and operated firms still in existence. Most were either operating under the maakloon system or being rented (disewakan) to non-pribumi businessmen who manage the firms. A recent government report suggested just over half the pribumi firms were controlled by non-pribumi managers or traders (Indonesia. Dinas Perindustrian Propinsi Jawa Barat, 1975:2). Yet more comprehensive information obtained subsequently indicates that non-pribumi control is greater still. Table 4.16, which provides rarely-found evidence of non-pribumi participation in industry at the local level, indicates that only 11 percent of the region's loomage is owned and controlled by pribumi businessmen. Chinese dominate the industry through direct ownership (64 percent of looms), rental agreements (20 percent) and putting out (five percent). Moreover, Chinese firms are more than twice as large on average as pribumi firms (64 looms per firm, as against 30).

The phenomenon of renting began only in the late 1960s and is confined largely to Majalaya. In most cases rental payments are based on total loomage, and range from Rp 7,000 per month per loom for Indonesian-made looms to Rp 15,000 for good quality Japanese looms. The nature of agreements and the amount of rent paid have changed in recent years, reflecting changes in the textile market and the relative strength of the

21 For example, only one of Yogyakarta's 17 mechanised mills is rented - owing to unusual family circumstances - and very few of the 70 or so firms in the Pekalongan district are rented.
Table 4.16: Ownership, Management and Firm Size in the Majalaya Power Loom Sector, 1976

<table>
<thead>
<tr>
<th>Size of Firm (Number of Looms)</th>
<th>Number of Firms</th>
<th>Total Number of Firms</th>
<th>Total Loomage</th>
<th>Average Loomage per Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Pribumi Owned</td>
<td>Pribumi-Owned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td>Rented</td>
<td>Work-Order</td>
<td></td>
</tr>
<tr>
<td>0-19</td>
<td>11</td>
<td>15</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td>20-49</td>
<td>34</td>
<td>16</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>50-99</td>
<td>35</td>
<td>4</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>100-299</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Total Number of Firms</td>
<td>97</td>
<td>36</td>
<td>65</td>
<td>17</td>
</tr>
<tr>
<td>Total Loomage</td>
<td>6167</td>
<td>1083</td>
<td>1919</td>
<td>527</td>
</tr>
<tr>
<td>%</td>
<td>64</td>
<td>11</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Average Loomage per Firm</td>
<td>64</td>
<td>30</td>
<td>30</td>
<td>31</td>
</tr>
</tbody>
</table>


Note: a This figure is greater than that given on page 100 of 8,106. The data are from the Majalaya Perteksi office, which has a wider geographic coverage than just kecamatan Majalaya.
two parties. A decade ago the textiles market was strong and relatively few factories were offered for rental. Until about 1974 rental agreements were concluded for quite long periods (two or three years). Recently however, rents have fallen in real terms. Also, rental periods have become much shorter – even three month agreements are not uncommon – hence a factory may be rented to perhaps two or three parties in one year.

Why has there been such a sudden change in the rental market? Part of the reason is the change in the state of the textile market. Since the mid 1970s the backlog in supply has been overcome. Thus weaving has become a less attractive industry and there are fewer businessmen wishing to rent mills. Another reason is the apparent weakness of pribumi entrepreneurship in the West Java textile industry. Whilst it is difficult to generalise, many firms which were established before 1966 have not been able to adjust successfully to the changed business environment of the orde baru. Under the old system of yarn allocation, the key to business success was obtaining yarn at low official prices. Profitability was guaranteed either by reselling the yarn on the black market or producing cloth for a sellers' market. Obtaining a yarn quota depended more on political connections than commercial acumen. Thus, after 1966 some of these firms were exposed to a competitive market environment for the first time, and many were unable to adapt.22 It might be asked why pribumi firms have survived in other regions, but not in Majalaya. Some of the reasons will become apparent in the discussion about developments in the Pekalongan district.

A final explanation of the changes in the rental market relates to the 'momentum effects' once maakloon and renting

22 Dick (1977:127-129) observes a similar trend in the inter-island shipping industry, noting that many of the old order firms have declined and been replaced by rapidly expanding non-pribumi business interests after 1966.
have become widespread. Owners of mills who have been renting or receiving work orders for several years are usually not in a position to resume full commercial operation of their factories. Many lack sufficient working capital. More importantly, their marketing expertise - what goods to produce (fibre, style, colour, quality, etc.) and which marketing channels to use - is seriously deficient. Once they have relinquished commercial and financial control of their firms they are unlikely to return to their managerial role. Indeed the Department of Industry's report about Majalaya suggested that, as they are edged out of the textile industry, there is a tendency for pribumi businessmen to revert to agriculture; that is, the sector in which they were engaged before the appearance of the modern textile industry. The report suggested the chain of events runs as follows:

farming → textile manufacture → maakloon → renting factory → selling factory → farming.

This is an interesting although as yet unsubstantiated formulation. Certainly the first four stages after farming are correct. With rising non-pribumi involvement in manufacture, maakloon has been the forerunner of renting. Then, after a period of renting and with so many other firms also being rented out, if the owner is faced with the prospect of having to manage the firm himself or selling (albeit at a 'low' price), the latter is usually chosen. However, which field of activity is entered afterwards is unknown.

4.9.2 Pekalongan District

Weaving and batik are long-established industries in the staunch Moslem area of Pekalongan on the north coast of Java. Much of this activity is centred in the city itself and the area to the south, along the road to the semi-industrial village of Pekajangan. Traditionally, Pekalongan was the second major weaving centre in the country: the industry
has never been as large as in Majalaya but, especially in recent years, pribumi participation has been far more significant.

The first ATBMs were introduced in 1936 and backstrap looms had been in use for many years prior to this (Kadarijah, 1959:84). Developments in the 1950s are not well documented but, as in Majalaya, Chinese traders were active in the region. One researcher notes the existence of 'credit relationships' between buyers and sellers and concludes that whilst 'in principle they differ from the maakloon system, in practice the two are almost identical' (Kadarijah, 1959:84). The growth of weaving throughout this period was linked closely to the role of the textile co-operatives, which were established under the initiative of the Muhamadiyah, the Moslem religious movement. In response to Chinese control over trade, the first of these co-operatives had been established in 1936, leading in the following year to a Traders' Association. The continued strength of these organisations in subsequent years has been an important factor explaining the survival of small-scale pribumi firms and the smaller role (compared to Majalaya) of Chinese traders.

Co-operative mills play a very important role in the region's industry. About one-third of the 4,000 power looms installed in and around Pekalongan were in these mills in 1976. They have also figured prominently in BKPM approvals (Table 4.15). In marked contrast to the situation in Majalaya, BKPM-approved loomage for non-pribumi firms is less than half Pekalongan's total, and in fact it is similar to that of the co-operative mills. Almost all power loom firms are small or medium in size: only four of the 60 privately-owned mills have

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23 The role played by the co-operatives and the Muhamadiyah in the textile industry has been documented recently by Price (1977:50-56).
more than 100 looms; for those firms with less than 100 looms the average is 37 per firm. Another indication of the small-scale nature of the industry is that in 1973 21 percent of the looms were more than 15 years old and less than three percent were fully automatic (Eshuis et al., 1974:33).

As in most other textile centres, hand loom weaving has declined sharply since 1966. In 1975 almost 23,000 hand looms were licensed in the region, the largest single concentration in Central Java, which in turn is the most important hand loom weaving province (Indonesia. Dinas Perindustrian Propinsi Jawa Tengah, 1976:25). Local officials estimated that by 1977 Pekalongan's hand loom sector was only about one-quarter of its size in the mid 1960s. Yet this figure is higher than that of Majalaya and, probably, Pedan.

Why has pribumi entrepreneurship in the weaving industry been stronger in Pekalongan than Majalaya? Clearly the co-operatives, as pribumi strongholds, have played a crucial role. Indirectly, they have also provided an impetus to small pribumi firms, through an informal diffusion of managerial skills and marketing knowledge. Underpinning this has been the Muhamadiyah. Whilst little research has been conducted into the link between religion and entrepreneurship in Indonesia there is little doubt that this is a factor of considerable importance, perhaps explaining in part differences in entrepreneurship between north and south-central Java.

Several other factors are also relevant. The town's batik industry, mostly under the control of Arab and pribumi

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24 By contrast, Majalaya has 21 firms with over 100 looms, out of a total of 215 firms. Note that apart from Table 4.15, all data in this paragraph are compiled from Indonesia. Direktorat Jenderal Industri Tekstil, 1976a.
25 Among the few exceptions are Geertz (1963), Price (1977) and Castle's (1967) study of the Kudus kretek cigarette industry.
businessmen, continues to support many small firms producing cambric. Indeed, several small mills are owned by batik producers, many of the result of backward integration by batik firms five or more years ago when supplies of cambric were less plentiful. Other weavers have fixed contracts with batik firms which have been in existence for years. An additional factor explaining the survival of small prihumi firms is that for many years Pekalongan and other northern coastal cities have been major suppliers of textiles to Kalimantan and Sulawesi.\textsuperscript{26} Much of this trade consists of small orders sent regularly by prahu (sailing boat). The fact that the trade is on a relatively small scale and is long established may have meant it has not invited competition from other suppliers. Finally, an important entrepreneurial group in the region (and the entire north coast of Java) is the Arabs. Whether due to religion or other factors this group is more integrated into the general community than the Chinese, their business circles are less exclusive, and their expansion thus less destructive of prihumi entrepreneurship. For all these reasons the demise of hand looms has been less rapid and the survival of prihumi businesses more important in Pekalongan than in Majalaya.

4.9.3 Pedan

The third major traditional weaving centre is Pedan, a small town in south Central Java, located off the busy highway which runs between Solo and Yogyakarta. In contrast to Majalaya and Pekalongan, where weaving has expanded, in Pedan the industry has suffered a major decline since 1966. The town is now an insignificant area in terms of total cloth production. As with the other centres, the ATBM was introduced into the region in 1930s. Two factors contributed

\textsuperscript{26} A 1974 survey of hand looms in the region found that about 11 percent of total production was sent directly to the Outer Islands (Laporan Hasil Survey ..., 1973:16). Since none of this would be cambric and additional cloth would be sent indirectly, the real significance of this market becomes apparent.
to the expansion of the weaving industry in Pedan after 1930. First it is a fertile agricultural region, which meant that agriculture generated a surplus for investment outside this sector; secondly, the town's proximity to the desperately poor limestone area of Gunung Kidul, which then (as now) provided a source of cheap labour for the industry (Kadarijah, 1959:85).

Hand looms have always dominated Pedan's weaving industry. Only two fairly small power loom firms have been established, both in the early 1960s. Given this almost exclusive reliance on hand looms, it is not surprising that the town's weaving industry has declined. 27 Moreover, the events of 1965-66 probably deterred potential investors from establishing mechanised mills in the town. During the orde lama, Pedan was a communist party (PKI) stronghold and, in contrast to Pekalongan, the local PKI leadership and the textile co-operative were closely linked. The downfall of the PKI led to the removal of much of the town's entrepreneurial talent and its driving spirit. Further, the town's co-operative had excluded Chinese traders, many of whom would have been reluctant to trade or establish factories in the town in the aftermath of the 1965-67 massacres. 28 Finally, the town has few positive attractions which outweigh the disadvantages. Although Pedan has a large number of experienced weavers, wages are much the same as the nearby city of Solo, which has the benefit of better infrastructure (electricity supplies, banks, etc.) and proximity to the huge textile market, Pasar Klewer.

27 In 1974 the town's village weaving unit, itself virtually defunct, estimated there were about 23,000 licensed hand looms in kabupaten Klaten, of which 10,000 were in Pedan, and that approximately 30 percent were still in use (Unit Desa Pertenunan, 1974:1-2). By 1978 the percentage in use was even lower.

28 In 1977 only one of the town's two dozen or so small stores was Chinese-owned, a most unusual situation in Indonesia.
4.10 Conclusion

In the mid 1960s the weaving industry in Indonesia was probably the least developed compared to that of any other major LDC. A combination of factors - the policy of the Dutch colonial government, economic policies after independence - had held back the development of the industry. During the last 15 years it has been rapidly transformed, and a significant modern sector component has emerged. Nevertheless, weaving is a relatively labour-intensive manufacturing activity, and small and medium weavers remain very important in the industry.

The purpose of this chapter has been to analyse recent changes in the industry. This will assist our examination of the government's policies towards the weaving industry (Chapter Five). In later chapters it will be shown that hand looms are not economic under most realistic assumptions. Thus the transformation of the industry was inevitable once the new government adopted more liberal economic policies. However, it will be argued that the specific form of many government policies encouraged the introduction of excessively capital-intensive techniques and hence exacerbated structural adjustment difficulties.

<table>
<thead>
<tr>
<th>Size of Plant</th>
<th>1974 and After</th>
<th>Before 1974</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>100 employees</td>
<td>50 employees without power</td>
</tr>
<tr>
<td>Medium</td>
<td>10-99 employees</td>
<td>5-24 employees with power</td>
</tr>
<tr>
<td>Small</td>
<td>9-18 employees</td>
<td>1-4 employees without power</td>
</tr>
<tr>
<td>Cottage</td>
<td>8 employees</td>
<td>Not paid employees</td>
</tr>
</tbody>
</table>

SBS also publishes Economic Indicators (Indikator Ekonomi), which contains production data, and price data for various grades of cloth.
APPENDIX 4.1

A NOTE ON SECONDARY DATA SOURCES FOR THE
INDONESIAN WEAVING INDUSTRY

1. Central Bureau of Statistics (BPS)

BPS collects a considerable amount of data on industry, the most important being the 1974/75 Industrial Census. This is the most comprehensive industrial census ever conducted in Indonesia, and contains information on employment, gross revenue and value added by industry, size of firm, technology and region. A serious drawback however, is that no information is provided regarding fixed and working capital.

Since 1970 BPS has published annually Industrial Statistics (Statistik Industri), which gives employment and value added data by industry for large and medium firms. After 1975 all large and medium firms have been included in the survey. In 1974 the definition of firm size was changed, thus the data before 1974 are not strictly comparable with later figures:

<table>
<thead>
<tr>
<th>Size of firm</th>
<th>1974 and after</th>
<th>Before 1974</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>&gt; 100 employees</td>
<td>&gt; 100 employees without power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 50 employees with power</td>
</tr>
<tr>
<td>Medium</td>
<td>20 - 99 employees</td>
<td>10-99 employees without power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-49 employees with power</td>
</tr>
<tr>
<td>Small</td>
<td>5 - 19 employees</td>
<td>1-9 employees without power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-4 employees with power</td>
</tr>
<tr>
<td>Cottage</td>
<td>&lt; 5 employees</td>
<td>no paid employees</td>
</tr>
</tbody>
</table>

BPS also publishes Economic Indicators (Indikator Ekonomi), which contains production data, and price data for various grades of cloth.

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1 The reliability of Statistik Industri data is discussed by McCawley and Tait, 1979a.
2. Department of Industry

Until January 1979 the arm of the bureaucracy in charge of the textile industry was the Directorate-General of the Textile Industry (Direktorat Jenderal Industri Tekstil, or Ditjenteks). Subsequently there has been a reorganisation and its functions have been distributed among three Directorates-General. Ditjenteks provided much information on the industry, of variable quality but improving in recent years. Through Department of Industry offices in each kabupaten and city, a reasonably up-to-date listing of all power loom firms is held. Basic data on each firm are published in Buku Petunjuk Industri Tekstil (A Guide Book for the Textile Industry), from which Tables 4.2, 4.3, 4.5, 4.16 and 4.17 are compiled. A list of hand loom firms is also maintained, but it is updated infrequently.

Ditjenteks published annual reports on the state of the Indonesian textile industry, and the Directorate's activities over the preceding 12 months. In the larger provinces a textile bureau publishes annual reports on the local industry. Ditjenteks also put out reports on various aspects of the industry (e.g., marketing problems of small-scale firms, the role of foreign firms) and the results of seminars.

2. Department of Information

This Department publishes two relevant documents. First, the President's annual Address of State (Lampiran Pidato Kenegaraan), which contains the most recent production data and details of any changes in government policy. Secondly, the Five Year Plan (Repelita), which outlines the government's priorities and strategies for the following five years.

3. The Capital Investment Co-ordinating Board (BKPM)

BKPM authorises the granting of taxation and other fiscal incentives to approved foreign and domestic investors (for a discussion of these, see Chapter Five). It maintains records of applications, and all approvals by productive capacity,
ownership, equity control (for foreign firms) and location. However, data regarding applications are of limited value because many such projects do not reach fruition. Moreover, approved productive capacity overestimates actual capacity. Finally, for various reasons, not all domestic firms which are eligible to apply for investment incentives do so.

5. Other Sources

(a) Universities: Universities occasionally conduct research into the industrial sector. However, manufacturing is a neglected field, and there has not been one major published survey of the weaving industry by Indonesian academic economists since 1965.

(b) The UNIDO Project: UNIDO has a long-running project to assist the small-scale textile sector in Indonesia. Many reports have been prepared, the majority of which are technical surveys of particular firms. Others present the results of seminars and workshops conducted with weaving entrepreneurs. Unfortunately, the usefulness of these reports is limited by the fact that most are published in English and that they are not widely distributed.

(c) Industry Associations: The two relevant bodies are the Chamber of Commerce (KADIN) and the Indonesian Association of Textile Producers (PERTEKSI). Neither body conducts any substantial research, although they are a good source of informal information on the industry and particular firms, at the regional level.

(d) State Commercial Banks: These banks put out very occasional reports, and they can also be a source of good local knowledge on the industry.
APPENDIX 4.2
THE WEAVING AND SPINNING INDUSTRIES IN INDONESIA COMPARED

Chapter Two (section 2.5), pointed out that substantial differences exist in the nature of the spinning and weaving industries. Spinning is a more capital-intensive and highly-concentrated industry, whereas weaving is characterised by low levels of concentration and a significant small-scale sector in low-wage countries. In Japan, hand-spinning disappeared quickly with the onset of industrialisation, but small weavers remained important for many decades. Since 1950 Indian Governments have promoted manual technology in weaving but not in spinning, except for one unsuccessful experiment. A similar picture of sharp differences between weaving and spinning emerges in Indonesia.

Table 4.17 presents data on productive capacity in the spinning industry according to ownership. The contrasts between

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign</td>
<td>Domestic</td>
</tr>
<tr>
<td>Government</td>
<td>407,348</td>
</tr>
<tr>
<td>Private</td>
<td>33,946</td>
</tr>
</tbody>
</table>

Source: As for Table 4.2
spinning and weaving are readily apparent (weaving capacity by ownership was given in Table 4.2). First, the weaving industry comprises almost 800 power loom firms and many hundreds of hand loom firms. There are only 74 spinning firms (although some yarn is still imported), hence the degree of concentration is much greater. Secondly, private domestic firms own just 30 percent of spinning capacity, in contrast to their dominant position in weaving. Foreign firms are more important in spinning, but the most significant difference concerns the role of government mills. Whereas in weaving they own about eight percent of mechanised looms, in spinning they own 31 percent. Moreover, government spinning mills are on average twice the size of privately-owned mills. Thirdly, there is virtually no small-scale mechanised sector in spinning. It is carried out either in relatively large factories, or by hand in the more remote parts of the Outer Islands. In fact, spinning is one of the few industries for which the technological dualism model is relevant. Unlike weaving, the range of efficient industrial technologies is limited.

There are several explanations for the differences in structure between the two industries. The government's role has been more significant in spinning, owing in part to historical factors. Successive Indonesian governments after independence saw the imbalance between the very small spinning industry and the much larger weaving industry as a colonial legacy which had to be overcome quickly. In order to prevent perennial yarn shortages, several large mills were established, some with the aid of Japanese war reparations. The government set up these mills because it accorded with its political priorities of expanding the state sector. Moreover, there were few investors willing to undertake such large investments in the uncertain business climate of the orde lama.
However, as was argued in Chapter Two, a larger government role is not the only reason why the structure of the two industries differs. Economic factors are also important. Technical economies of scale are far more significant in spinning because of the integrated nature of the production process. Hence larger plants are able to achieve substantial unit cost reductions. This is in contrast to weaving, where equipment is far more divisible. In addition, yarn is a homogeneous good, well suited to mass production techniques. There is little scope for small spinning firms catering for specific markets with regard to pattern, design and texture in the way that small weaving firms do.
APPENDIX 4.3

AGAINST THE TREND: SOME ATBM 'SUCCESS STORIES'

This thesis is not a study of entrepreneurship. However, in comparing the economic performance of the four main techniques in the Indonesian weaving industry, the importance of entrepreneurial capacity should be emphasised. In general, the similarity in performance between firms employing the same technique was found to be surprisingly high. This was especially so for firms in the modern sector. Amongst smaller firms, the range in performance was somewhat greater. Chapter Four has discussed the general decline in the hand loom sector. The purpose of this Appendix is to examine briefly the record of some successful hand loom firms. The discussion supports our findings of later chapters that hand loom firms are unable to compete directly with mechanised mills: the successful firms have diversified into other types of cloth not suited to the larger firms.

1. Firm A: Rural Pekalongan

Firm A was established in the early 1960s and is run jointly by a husband and wife. The husband has a middle-level management position in a large textile factory nearby, and holds an Economics degree from the University of Indonesia. The wife, who is involved in the day-to-day running of the firm, also engages in a limited amount of batik trading.

Until January 1976 the firm produced sarung but, faced with declining profitability, it was decided to switch over to producing gauze (kain kasa). This step was taken after examining the market for gauze, and involved the purchase of a special attachment for each loom costing Rp 4,000 (about $10). Since then the firm's profitability has improved greatly. When
visited in November 1977, plans were in hand to double
capacity from 25 to 50 looms. Currently, all output is sold
to a Chinese trader in the city, who sterilises, packs and
distributes the cloth. However, the firm is an independent
unit, in the sense that it is not contract weaving. Whilst
there is resentment at what they consider to be the Chinese trader's excessive profits, his role is indispensable because he releases the husband for work in the factory.

Several factors explain the firm's success. First, the
husband's position is crucial. His university education and employment in the modern factory enable him to assess market conditions better and deal competently with the Chinese trader and government officials. Recently he obtained credit from a state bank - a rarity for hand loom firms. Secondly, the nature of the product is important. The demand for gauze is not subject to great seasonal fluctuations, hence working capital is small. Further, there is not the fierce competition which characterises the market for most other types of cloth. Large mechanised mills are not interested in producing a good which has a relatively small market. Other hand loom weavers are either unaware of the market potential or risk averse (to the additional investment).

2. Firm B: The City of Pekalongan
This firm is run by a remarkable man whose family migrated from Pakistan several generation ago. The owner, who is fluent in five languages, devotes relatively little time to the financial affairs of his hand loom enterprise, preferring instead to pursue his other interests which include art and literature. He is also a very strict adherent to Islam. A wide variety of goods is produced: woven carpet, imitation Sumba and Timor rugs, towels with individual insignias (the latter has developed into an important household industry in Pekalongan, at his example) and many woven bamboo goods, from place mats to ties and even shoes.
The enterprise usually employs about 10 or 15 people, although there is little doubt it could be expanded rapidly if the owner wished. Rather he concentrates on producing a few highly-profitable goods,¹ and devotes the remainder of his time to experimenting with new designs and his many other activities. He pays little attention to the marketing of his cloth - though much to design - because his reputation is such that buyers seek him out. (On several occasions he has received orders from overseas, but has not been able to supply them within the required time period.) This, plus the fact that there is no competition from power looms for the cloth which he produces, assures the continued success of his operation.

He is dismayed at the decline of the hand loom sector and, by his own example, has encouraged the growth of some hand weaving enterprises. However, his differences with government officials over the issue of bank interest prevent him from playing a more effective role in the development of a prospering handicraft industry.

3. Firm C: Majalaya

This firm was established in 1972, although the family has had experience with hand looms from about 1960. It produces medium to high quality polyester and polyester/TC sarung on about 25 hand looms. During the busy months before Idul Fitri, they also put out work to nearby rural households.

The firm's output has been stable over the past five years, owing to its unusual method of yarn purchase. It has an arrangement with a number of spinning factories in and around Bandung whereby it purchases any unwanted yarn the factories wish to dispose of, at or below cost price. This includes yarn in discontinued colours in quantities too small to be sold

¹ Mark-ups are as high as 100 percent for some goods, compared to the norm for hand loom firms of between five and 10 percent.
commercially, and yarn of slightly inferior quality or containing dye imperfections. These are always pre-dyed yarns, hence the firm cannot determine what colour sarung is to be produced. This reduces the sarung's selling price, but the effect is marginal compared to the cost saving.

Firm C provides a good example of one of the roles small-scale industry can play. Whilst smallness has certain economic costs (e.g., the inability to exploit economies of scale), it does permit greater flexibility. If there is a temporary reduction in yarn supplies, workers can be dismissed and less fixed capital is left lying idle than is the case with larger mechanised mills. The firm is also of interest because it was argued above that Majalaya's proximity to Bandung may have been a factor contributing to the more rapid decline of the local hand loom sector than has occurred in Central Java. However, this firm's progress is complementary to the expansion of the modern textile sector.

4. Firm D: Rural Jepara

Firm D is located in the strong Moslem region of Jepara (northern Central Java). It is owned by the head of a village weaving co-operative which was dormant until recently. The village is unusual because there is no substantial concentration of hand loom weaving within a radius of 80 kms, and it is one of the few hand weaving centres of Java which is prospering. The recent history of the firm and the village's weaving industry are closely related. A researcher visiting the village in 1971 (Soeroso, 1971) estimated there were about 100 hand looms in use and that hand weaving was on the decline. During the early 1970s the head of the co-operative, an innovative and creative man, realised the potential that existed for weaving imitation Sumba and Timor cloth on an ATBM rather than the backstrap loom and began some experimental weaving. Although the cloth lacks the richness of design of the authentic product, one piece can be woven in three or four hours, as against about three days using a backstrap.
In the following years the firm and the village flourished, and by 1977 about 250 looms were in use. About 90 percent of output is sold directly to traders and art shops in Bali and Jakarta — mostly the former — for sale to tourists. Like the cloth produced by Firm B, there is no competition from power loom firms owing to the intricate nature of the weaving process. If, however, the village is to continue expansion of its cloth output, additional markets will have to be sought and a more professional approach to marketing adopted.

The outward appearance of the workplace belies the fact that relatively expensive cloth is being produced for high-income consumers. It is located well off the nearest asphalt road and is inaccessible to andong (horse and cart) in the wet season. Weaving and living quarters consist of a simple wooden and gedek (woven bamboo) construction. However, weavers' wages are significantly higher than other areas, reflecting their skill and the market for which the cloth is produced.

5. Firm E: Denpasar

The fifth successful hand loom firm is located in Denpasar, the capital of the tourist island Bali. Established in the mid 1930s and run by the same family ever since, it produces a decorative cloth (kain Bali) together with smaller quantities of sarung and selendang, on about 40 looms. The owner, who has been with the firm from the beginning, believes that the last decade has been the most prosperous. This firm has continued to produce the same type of cloth, unlike other firms whose success is attributed to a change in product lines. Hence its growth is solely the result of tourism. This has

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2 In 1977 the owner estimated its capital value at around Rp 100,000, or equivalent to the retail value of about one dozen of his blankets.
benefited the firm both directly through the purchase of cloth by tourists, and indirectly through hotel orders for bed and furniture coverings, staff uniforms and curtains.

The regional government has played a positive rôle in the development of hand loom firms. Apart from the benefits of tourism, the government has made more than symbolic attempts to encourage the wearing of locally produced cloth once a week, and government offices (especially the state banks) are discharging their functions reasonably efficiently. ³

6. Conclusion

Two conclusions emerge from this brief survey of successful hand loom firms. First, these firms are generally not in direct competition with the power loom sector. Just as the independent weaver in Japan survived by specialising in the production of cloth not suited to the large mills, so these firms are generally producing cloth which the mill sector does not produce. Several of these successful hand loom firms produced cambric and sarung a decade or more ago. They have since switched; the number of hand weavers producing mass consumption textiles in Indonesia has been decreasing rapidly.

A second conclusion relates to the importance of marketing. Established hand loom firms experienced difficulties after 1966 not just because of the rapid growth of the power loom sector, but also because the marketing channels of the orde lama (through the co-operatives) were dismantled rapidly. For firms to survive it was necessary to pay much more attention to marketing - markets had to be sought, provision made for working capital, and decisions taken regarding product design and quality. This required a new set of skills, which distinguishes the owners of most successful hand loom firms.

³ The record of this firm is indicative of the state of hand loom firms in Bali. Over the period 1968-1976/77, the local office of the Department of Industry estimates employment has risen from about 550 to 3,380 persons. This probably underestimates the expansion because hand loom data are updated only occasionally.
CHAPTER FIVE

GOVERNMENT POLICY AND THE INDONESIAN WEAVING INDUSTRY

The purpose of this chapter is to analyse the Indonesian government's industrial policies, with particular reference to the weaving industry. This analysis is central to our study. One of our main arguments is that government policies have encouraged the selection of inappropriate industrial technology in Indonesia. We will argue that policy reform is essential if less capital-intensive techniques are to be adopted.

Most LDC governments intervene extensively in the economy. It is usually argued that this intervention is discriminatory, because governments foster the development of the modern, capital-intensive sector at the expense of the traditional sector by channeling an undue proportion of scarce economic resources to the former. In section 5.2 some of the reasons for government intervention are discussed briefly. If policy reform is to be achieved, it is just as important to understand why governments intervene as how they do. Section 5.3 considers in greater detail the arguments regarding the nature of LDC government intervention.

The remainder of the chapter examines the Indonesian government's industrial policies during the 1970s. Discussion centres on taxation regulations and other aspects of fiscal policy, labour legislation, the pricing of foreign exchange and government goods and services, and policies towards small-scale industry. Appendices focus on two additional aspects of government intervention. These are the decision to prohibit the import of second-hand textile machinery, and the economic performance of state weaving enterprises. Another very important facet of government intervention - the role of state commercial banks - will be discussed in Chapter Six, as part of our analysis of the capital market. It is necessary to examine the government's policies in some detail. Far too often, generalised assertions are made regarding the nature of
the Indonesian government's policies based on insufficient information. It is also necessary for the purposes of this thesis because later chapters will attempt to measure the impact of several policy changes on the competitiveness of techniques in the weaving industry.

5.2 The Ideology of Intervention

An overriding characteristic of most LDCs which have gained independence since 1945 is the dominant economic role played by the government. The government's share of national income is usually lower and their administrative structure weaker than that of western countries. Yet, as Little, Scitovsky and Scott (1970:35) concluded from their country studies on trade and industrialisation:

All the countries here considered pursued deliberate economic policies and carried government intervention in economic affairs much farther than is usual in the developed countries of the west, making much greater use of most tools of economic policy.

In a similar vein, Myrdal (1968:712) refers to what he calls the 'planning ideology', arguing that in South Asian countries it rules supreme. This does not mean that these countries have adopted economic planning in the sense that the government sets comprehensive targets and directs resources towards their fulfilment. Indeed as Myrdal - himself an advocate of such planning - observed, perhaps somewhat contemptuously:

Only a few of the South Asian countries have made really serious attempts to bring their economic life under the discipline of economic planning .... But the idea of planning represents an attitude ... about how state policies ought to be viewed. Even where there is little actual planning, and still less implementation, the ideology of planning serves as a rationalisation for interventionist practices (Myrdal, 1968:714).

It is useful to consider the record of government intervention in Indonesia in light of the assertion above by
Little et al. because the change of government in 1966 was seen as ushering in a new era of liberalism. As we saw in Chapter Three, the period 1950-1965 was characterised by an expansion in the role of the government and increased regulation of the private sector. Writing just before the end of the orde lama, Castles (1965:13) observed:

Rejection of capitalism and espousal of socialism as the preferred pattern of economic organisation has been an almost universal element in Indonesian political ideology since independence.

After 1966 significant steps were taken towards liberalisation of the economy: government intervention was reduced, more emphasis was placed on the private sector and the role of market forces, and state enterprises were to be run on strict commercial principles. Since the early 1970s however, the government has become increasingly interventionist. As McCawley (1979:79, 38) observes, there is 'almost no questioning of the paternalistic role that the state plays', and there is no significant group 'which publicly argues the case against government intervention'.

Government intervention in most LDCs is so pervasive that, before describing its characteristics, it is necessary first to consider the reasons for this intervention. Although its nature and extent varies, at least three general reasons can be advanced to explain the tendency towards government intervention that is found in many newly independent countries.

First, the legacy of the colonial era is important. Especially in countries which had to struggle to achieve independence, there was strong resentment of the colonial power and, by association, its method of economic organisation. The market was seen as an exploitative tool adopted by the rich and powerful during the colonial era. Hence there was a distrust of unregulated competition and reliance on the market
as an allocative mechanism, which manifested itself in government intervention. Other aspects of colonial rule and its aftermath reinforced this trend. The paternalistic and authoritarian nature of most colonial regimes shaped the attitudes of the new political and bureaucratic elite. This was especially so where the military played an important role in achieving independence. As the Indonesian experience indicates, this group is not generally predisposed towards decentralised decision-making processes.

Further, in many Southeast Asian and African countries indigenous entrepreneurship was held back during the colonial era because the modern sector of the economy was controlled by business interests from the colonial power and other non-indigenous minorities. This was the case in Indonesia, as Castles (1965:14) pointed out:

Commercial and entrepreneurial functions were almost entirely taken out of the hands of the indigenous population and were exercised by the European and Chinese minorities.

After independence the new group of leaders inherited an economy much of which was dominated by 'foreign' business interests - Dutch, Chinese and, to a lesser extent, Arabs and Indians (although many of the latter three groups had lived in Indonesia for generations). The government, in seeking to control the 'commanding heights' of the economy, either had to expand the role of state enterprises or rapidly develop an indigenous business class. Both solutions inevitably resulted

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1 A continuing preoccupation of Indonesian governments has been the golongan ekonomi lemah (weak economic group), which usually refers to small pribumi businessmen. Unregulated competition would, it is feared, lead to this group's demise because it is unable to match the Chinese business community.
in a diminished reliance on the market as a co-ordinating mechanism.  

A second set of influences derived from the nature of the political and social elite in newly independent countries. In many countries this elite was a relatively small cohesive group, lacking significant economic power, and western-oriented in outlook. All these factors resulted in a larger role for the state than might otherwise have been the case. The fact that this group did not have an important economic base meant it had a vested interest in expanding the government's role, thus generating jobs as planners, ambassadors, bureaucrats and managers.  

Being western-oriented if not educated, it was attracted to the notion of economic planning, an attraction which was reinforced by the widespread intellectual appeal of Marxism. This was despite the fact that, as Myrdal (1968:738-739) perceptively notes, economic planning in the west was a consequence of industrialisation and the emergence of a mature industrial society. It was not adopted before significant industrialisation had occurred, as is the case in LDCs. Finally, the elite's social cohesion and small size enabled it to act effectively in the preservation of its own interests.

Thirdly, government intervention has been prompted by the enormity of the task facing LDCs. The political climate has demanded rapid development, 'catching up with the west', and a rejection of gradualism. In such a situation political leaders are under strong pressure to initiate large projects as visible evidence of progress (Myrdal, 1968:715-716). Unfortunately

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2 Economic policy-making during the 1950s can largely be seen in terms of government attempts to reduce the role of foreign (asing) business interests. Good descriptions of policy-making during these years include those by Glassburner (1971) and Mackie (1971).

3 In the words of Castles (1965:14-15), "As employees of the state, the elite had every reason to favour the maximisation of its economic role ... since only they had the education deemed necessary to administer the foreign properties should they be taken over."
however, this urgent desire for progress has often resulted in wide-ranging government regulation and intervention, but insufficient attention to essential tasks which only governments can perform. In the words of Bauer (1971:91), these governments "seem anxious to plan and are unable to govern". Paradoxically, he claims, governments have neglected their essential functions (the fulfilment of which "would fully stretch the human, financial and administrative resources of all governments in poor countries") while "attempting close control of the economy".

5.3 The Nature of Intervention

Much of the discussion regarding the nature of government intervention in the economies of LDCs may be summarised in two general (though not identical) propositions: First, government policies tend to lower the cost of capital and raise the price of labour, thus providing a strong incentive for private investors to adopt excessively capital-intensive techniques. Secondly, governments mobilise resources in favour of large firms in the modern sector, to the detriment of small, labour-intensive firms. As a result, Little, Scitovsky and Scott (1970:8) conclude, in most LDCs "the methods used to encourage industrialisation have tended to ... create a bias against the employment of labour."

The nature of post-colonial government intervention has led to a renewed discussion of the relevance of dualistic economic models for LDCs. However, the more recent definition of (and explanation for) dualism differs from earlier expositions. The first writer to devise the concept was Boeke (1953). Writing in the early twentieth century, he saw dualism arising out of the clash of two cultures, when an imported and more economically-advanced social system is introduced into a traditional society. In Boeke's view, a distinct cleavage is maintained between the two social systems. They differ with regard to social and business organisation, living standards, and motivation. Boeke's analysis contained
many insights into aspects of the Netherlands East Indies society, but his views were heavily influenced by the experience of the colonial era. The second major theory of dualism was that developed by Higgins (1968: Chapter 14). Higgins did not deny the existence of dualism, but disagreed with Boeke's explanation for it. He argued that dualism arose because of the lack of technological alternatives for investors in the modern sector of LDCs. Technical coefficients in this sector were rigid (or nearly so) and thus factors of production could be combined only in fixed proportions whereas, at the other extreme, in the traditional sector they were flexible. It was the coexistence of these two sectors which Higgins labelled technological dualism. 4

By contrast, recent explanations of dualism emphasise the nature of government intervention which, it is maintained, has erected artificial barriers to the movement of resources between the modern and traditional sectors. A foremost exponent of this view is Hla Myint who argues that the most significant aspect of government policy is that scarce inputs such as capital funds, foreign exchange and public economic facilities ... are being made available on excessively favourable terms to the larger units in the modern sector ... and on excessively unfavourable terms to the small economic units in the traditional sector (Hla Myint, 1971:315-316).

Myint's basic argument is that LDC government intervention is prompted by a distrust of the market as an allocative mechanism. This intervention creates a disequilibrium situation however, because scarce economic resources (capital, foreign exchange) are priced too low, hence requiring a system of rationing. It is this rationing process, he argues, "which has aggravated the unequal access to scarce resources suffered by the small

4 The notion of technological dualism and its limitations are discussed in Chapter Eight (section 8.5).
economic units in the traditional sector". The failure of LDC governments to promote internal economic integration is also central to the analysis of Little, Scitovsky and Scott. For example, they observe (1970:90-91) that one of the most serious consequences of post-war import substitution strategies is

the gulf that is being created in many developing countries between the highly capital-intensive and automated equipment and modern methods of large-scale industry and the primitive labour-intensive methods of small-scale craft industries and agriculture. The modern and traditional sectors exist side by side; but the gulf between them [is] great and unbridged.

The policies which have created the gulf between the modern and traditional sectors and hampered the process of internal economic integration are well known and have been extensively documented.

First, most LDCs have maintained an overvalued exchange rate. *Ceteris paribus*, this created a bias in favour of import-intensive activities because it cheapens the domestic-currency price of imported raw materials and equipment. There are several reasons why LDC governments have been reluctant to adopt an equilibrium price for the currency. Devaluation is seen as a sign of failure and hence a loss of national prestige. Its short-run inflationary effects are feared. The system of import licensing, which an overvalued rate frequently results in, provides scope for increasing government revenue through the taxation of rents accruing to importers; it is also a vehicle for political patronage. 5 Large firms in the modern sector benefit from this policy because they are usually more import-intensive than their competitors in the small-scale sector. Moreover, exemptions from import duty, a common feature of

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5 Numerous studies discuss the importance of these factors in particular countries. See for example, that by Glassburner (1968) on Pakistan in the 1960s.
investment packages in LDCs, exacerbate the bias because they further cheapen the domestic-currency price of capital-intensive imported machinery.

Secondly, it is argued that government intervention in domestic factor markets has distorted relative factor prices and provided an additional incentive for firms to adopt capital-intensive techniques. In the capital market this intervention has resulted in a situation which Balassa (1977:10) has called "financial disintermediation". Low or even negative real interest rates for borrowers have reduced the supply of funds in the organised credit market (because real interest rates for savers are very low) whilst increasing the demand. Hence a system of rationing has been introduced which favours better connected - but not necessarily lower risk - firms in the modern sector. In addition, a range of fiscal inducements (eg. investment allowances) is provided to larger firms, most of which cheapen the cost of capital still further. In the labour market, government policies have a similar effect on the wage/interest ratio, by raising the price of labour to firms in the modern sector. These policies include minimum wage legislation, restrictions on the dismissal of employees, and penalty rates for night and weekend work.

Thirdly, government economic services, including power, transport and communications, are frequently provided at a loss. Because large firms are the main industrial consumers of these services, this amounts to a subsidy to them. Finally, government bureaucracies in LDCs operate in such a manner that large firms are in a better position to take advantage of the benefits offered. In addition to better political connections, larger firms have skilled staff better able to satisfy the bureaucracy's requirements (eg. in obtaining licences, taxation concessions). They are located in or near larger cities, thus enabling easier access to heavily-centralised bureaucracies. Their problems are also more likely to receive sympathetic understanding from the upper echelons of the bureaucracy (IBRD, 1973).
The rapid introduction of modern technology and business organisation into LDCs inevitably results in a transitional period of uneven development in which pre-capitalist society adapts to the new commercial and technological environment. In the process, small firms in the traditional sector are disadvantaged by the undeveloped state of factor markets and weaknesses in the government's bureaucracy. However, according to the argument advanced by Hla Myint and others, government policies exacerbate the problem by creating a cleavage between the modern and traditional sectors which reduces the fluidity of the industrial structure. In the words of Hughes (1974:39):

The policy framework encourages discontinuity between sharply differentiated small and large sectors, and makes movement between these sectors extremely difficult.

Thus, this approach rejects technological and sociological explanations of dualism and argues that the main factor is the discriminatory nature of government intervention.

In the following section the merits of the argument in relation to the Indonesian weaving industry will be examined. It is important however, to see the argument in proper perspective. First, it is not applicable to all LDCs. For example, in Chapter Two (section 2.4) it was pointed out that successive Indian governments have restricted the growth of the (modern) mill sector and promoted small firms in the decentralised sector. Secondly, the existence of an overvalued exchange rate does not necessarily assist import-intensive activities, because many LDCs experience balance of payments difficulties.

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A useful classification of countries in Asia is that developed by Hughes (1974), who argues that three principal models may be distinguished. Model I refers to those economies in which market prices are not seriously distorted (e.g. South Korea). Model II, China, is an autarkic economy in which the market has been discarded, but in which factor endowments are heeded in setting prices. Model III is characterised by a bias against agriculture, exports, and labour-intensive manufactures. Myint's analysis is applicable only to Model III economies.
difficulties - partly because of their pricing of foreign exchange - and hence foreign exchange is not always available. For example in Indonesia during the orde lama the rupiah was generally overvalued, but the potential benefit to import-intensive activities was outweighed by the difficulty in obtaining foreign exchange.  

A third objection to the argument is that government promotion of modern industry and neglect of the traditional sector can be a double-edged sword. In fostering the development of large firms, governments may expect to derive political and economic benefits in return for their patronage. Bureaucracies in most LDCs are weak. Large urban-based firms have more difficulty evading government regulations than small rural firms. For example, taxation and other official (and unofficial) exactions may be relatively heavier and regulations regarding minimum wages less easily avoided. Consequently, the two propositions advanced at the beginning of this section - that governments distort the wage/interest ratio and mostly patronise large firms - are not identical. Governments have tended to bias factor prices in the direction of encouraging the adoption of unduly capital-intensive techniques. However not all these policies necessarily assist firms in the modern sector.  

5.4 The Indonesian Government's Industrial Policies  

5.4.1 Introduction  
This section examines the Indonesian government's policies towards the industrial sector with special reference to the weaving industry. The following parts will evaluate taxation policy, labour regulations, specific programs to assist small  

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7 Nevertheless, Myint and others could plausibly argue that in most LDCs the political power of the large firms would result in them getting the lion's share of this scarce foreign exchange.  

8 This argument is developed in some detail by Singer, 1970.
industry and the pricing of foreign exchange and public facilities. Our main argument will be that the net effect of government intervention has been to create a significant bias towards capital intensity. This accords with the theory of government intervention developed in the previous two sections. Nevertheless, these distortions are probably no more serious than is the case in numerous other LDCs.

There are several obstacles which stand in the way of a proper evaluation of the government's policies towards industry. Many statements regarding industrial policy in the Five Year Plans and other official pronouncements are so all-embracing and vague as to be almost meaningless. Difficulties also arise because of differences between government departments and between the various levels of government (central, provincial and even kabupaten) in the implementation of policy. Moreover the task of making a balanced appraisal of government policies in countries like Indonesia is hampered by relatively poor channels of communication outside urban areas, and widespread ignorance.

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9 For example, Repelita I stated that industries to be supported would include those that support and complement the agricultural sector, earn or save foreign exchange, process domestic raw materials, are labour-intensive, and promote regional development (Indonesia. Departemen Penerangan, 1969, Vol. 2B:5). Clearly these criteria could be invoked to support almost any sector of any industry.

10 An example of the former is the differences that were said to have occurred between the Departments of Industry and Trade over the December 1976 measures to increase protection to manufacturers (Grenville, 1977:24). An example of the latter is the assistance hand loom weavers receive in Bali compared to some other provinces (see Appendix 4.3).

11 For example, fully 12 months after the heavily protectionist measures of December 1976, many small and medium firms were unaware of their existence. Similarly, many small and medium firms remain ignorant of the government's minimum wage regulations (on this, see McCawley and Manning, 1976:47).
5.4.2 The Impact of the Taxation System

5.4.2.1 Main Features of the Taxation System

For many years the rate of company taxation was approximately 45 percent of net profits, but beginning in the fiscal year 1979/80 comprehensive reforms were introduced (see Booth and Tyabji, 1979:16-18). A wide range of fiscal incentives is offered to foreign and domestic investors. These are based on regulations drawn up in 1967 and 1968 respectively. They include a tax holiday for between two and six years (depending on the priority accorded to the investment), an investment allowance of up to 20 percent for projects not eligible for the tax holiday, accelerated depreciation allowances, indefinite carry-forward of losses incurred in the first six years operation, exemption from import duty on raw materials and equipment for the first two years, and a tax amnesty provision (regarding sources of investment funds) for domestic investors. Despite many official statements regarding the importance of employment creation, little weight is given to this goal in practice. The incentives apply both to new factories and, where appropriate, extensions to existing plants, providing the firm is to acquire new machinery (see Appendix 5.1).

Taxation regulations in the case of small firms are less clear. In theory at least, established small firms are required to pay company tax at the same rate as larger firms. However, the owners of smaller household enterprises, who are often engaged in several activities, usually only pay income tax. Because income tax rates are less than company tax rates, small firms probably derive some advantage from their size. Nevertheless, all firms in the 'factory sector' pay the same taxation rates. In the weaving industry this includes all mechanised firms and substantial handloom operations.12

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12 Two other features of the taxation system are of some relevance to our discussion. First, co-operative mills are granted additional concessions (a lower rate, and permission to return a percentage of their net profit to members before
Two issues arise in assessing the fiscal incentives offered to investors. The first is the magnitude of the concessions, in terms of tax revenue foregone. It is generally agreed that in order to attract foreign investors to LDCs some incentives must be offered, and further that Indonesia's regulations are fairly liberal compared to most Asian countries (Yoshihara, 1978:69). Second, there is the effect these regulations have on relative factor prices and hence on the selection of industrial technology. Because we are concerned with the impact of government policies on the choice of technique, we shall be concentrating on the second of these issues.

5.4.2.2 Taxation Procedures in Practice

First however, it is necessary to make a brief digression into taxation procedures in Indonesia. Any assessment of the impact of the incentives requires some understanding of the very complicated processes involved. For westerners accustomed to the relatively well-ordered taxation procedures in their own countries, the Indonesian system appears as a vast, unregulated maze, with the only established principles being tawar-menawar (bargaining) and main-main (playing about). In many respects, the system resembles the process of collective bargaining, although taxation regulations are, in theory, reasonably clear. Circumstances differ between firms and regions, but in most cases the procedure commences with firms submitting a set

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12 (continued)

being liable for taxation); secondly, there is no sales tax on cloth, but in some industries a differential sales tax is levied according to the technique of production. We shall return to the second regulation later.

13 The Directorate-General of Taxation publishes an annual guide to company taxation regulations entitled Pajak Perseroan. However, firms are subject to a range of additional levies, both official and unofficial, from different levels of government, various government departments and the military.
of falsified books recording their transactions over the past year. The subsequent rejection by the taxation office of the initial submission sets in train the two processes mentioned above. The two parties tawar-menawar over the sum to be paid. In the process the officials often ask for, or have pressed upon them, additional payments as an incentive to understate the firm's profit for taxation records.

It is not surprising that the two groups mistrust each other. Local taxation officials complain that businessmen always understate their income or claim they keep no records for their firms. In addition, these officials are subject to exhortations from higher echelons to increase official revenue. Periodically this takes the form of target fever (demam target). Conversely, businessmen reserve some of their most trenchant criticism for the taxation department. Many claim to have presented an accurate record of their firm in the past, only to have taxation officials arbitrarily increase their assessment.

It is difficult to obtain detailed information on taxation payments and bribery. Naturally, this is an extremely sensitive issue for most businessmen. However, two examples from our fieldwork give some indication of the magnitude of the phenomenon. The first relates to the practice of firms understating their profits in order to obtain tax relief. A typical case is a medium sized mechanised mill, from which the following information was obtained. For the years 1974-76 its

14 It is well known in Indonesia that many businessmen keep three sets of books: a 'pessimistic' set for taxation officials, an 'optimistic' set to be used in connection with applications for state bank credit, and an actual set.

15 This may not necessarily be because of the dishonesty of the official. The taxation department has a schedule of prices for various commodities (eg. medium quality cotton sarung) which it uses in assessing the gross revenue of firms. For such a heterogeneous commodity as cloth, the accuracy of the price data is very doubtful, particularly during a period of high inflation.
actual profit, recorded profit (for taxation purposes) and company tax paid (in Rp million) were:

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual profit</th>
<th>Recorded Profit</th>
<th>Company Tax Paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>6</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>1975</td>
<td>9</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td>1976</td>
<td>19</td>
<td>2.8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Actual profit was as much as 10 times greater than recorded profit. Also, for two out of the three years the amount of company tax paid exceeded the recorded profit!

The second example is the importance of unofficial payments relative to the official assessment. Although reluctant to give details, many weavers stated that unofficial payments (those related to taxation payments and other levies only) exceeded official payments. Unofficial payments include a wide variety of compulsory and voluntary exactions in addition to the bribes paid to tax officials. These range from relatively small payments to local governments to ensure harmonious day-to-day working conditions,\(^\text{16}\) up to the much larger sums outlaid to secure the protection and patronage of important army officers. As with additional payments required to secure bank loans, there are substantial 'pecuniary economies of scale' accruing to large firms. (This is explained in Chapter Six, section 6.4.)

This brief digression into taxation procedures in Indonesia demonstrates two points. First, because the government is unable (or unwilling) to fully implement its

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\(^{16}\) The experience of the Chinese owner of a medium-sized mill in West Java is typical of these sorts of payments: "The people from the kampung used to throw rocks through the windows and on the roof of my factory. Some time ago I discussed the matter with the head of the R.T. [rukun tetangga or neighbourhood council]. Now I pay him Rp 40,000 [a little under $100] each month and I have no more trouble".
fiscal regulations, the nominal benefits offered by the BKPM are in fact overstated. Owing to poor and erratic enforcement, firms exempted from taxation and other levies would not normally have to pay the full amount in any case. A distinction should be drawn here between foreign and domestic firms. The latter are better able to avoid the regulations, which explains why not all such firms—especially medium and smaller ones—apply for the concessions. On the other hand, the concessions are more important for foreign firms. For various reasons they are less likely to practise wide scale tax evasion, a point frequently overlooked by critics of foreign investors in LDCs.

A second implication is that policies which seek to achieve specific ends through taxation reform are liable to fail unless taxation regulations and collection procedures are very simple. This is an important consideration because a number of writers and government advisers in Indonesia have advocated quite sophisticated fiscal measures to encourage firms to adopt more labour-intensive techniques. These range from the granting of subsidies (in lieu of tax holidays and investment allowances) to firms, determined by the capital-labour ratio of the project (Donges, et al. 1974:107-109), to an elaborate points system whereby the value of concessions would depend on the score a potential investment project earned according to various criteria (Bartsch, 1977). Despite their undoubted merit in theory, many of these reforms would be unworkable given present taxation procedures, and thus can be ruled out on this ground alone. A number of simpler alternative measures to achieve similar ends are discussed in Chapter Eleven.

17 Under this proposal investors would submit their projects to a 'Ranking Test' with points being allocated according to the project’s contribution to output growth (maximum 25 percent), employment creation (20 percent), income distribution (15 percent), use of local materials (10 percent), weaker economic groups (10 percent), foreign exchange savings (10 percent) and regional development (10 percent).
5.4.2.3 Assessment of the Taxation System

The distortionary effect of several of these fiscal incentives is frequently referred to in the literature on choice of technology in LDCs but little quantitative evidence exists regarding their precise impact. One country for which the effects have been estimated is the Philippines, which offers a similar range of concessions to investors as Indonesia. An ILO study estimated that for a firm which takes advantage of all the incentives offered the reduction in the annual cost of capital would exceed 40 percent. A simple model measuring the relationship between the rental/wage ratio and the demand for labour was constructed. This led to the conclusion that a one percent fall in the rental/wage ratio would be likely to reduce the expansion in manufacturing employment by 0.9 percent (ILO, 1974a:253).

In Indonesia it is recognised that investment incentives may be retarding the growth of manufacturing employment. This view has been expressed publicly by several senior officials. For example, commenting on instances of "inappropriate technology" in Indonesia, Professor Sadli, a leading economist and Minister throughout most of the orde baru, observed:

> Investors' preferences and imperfect markets may not be the only culprits. The incentive system ... may have contributed much to the distortions. These benefits usually take the form of import duty exemptions for plant equipment, raw materials and spare parts. Tax holidays on corporate profits are also popular. All this distorts factor prices and puts a premium on capital intensity (Sadli, 1974:366-367).18

18 Another example is the statement of the present Minister of Industry (then Deputy Chairman of the BKPM), A.R. Soehoed, in discussing the inflow of foreign investment into Indonesia since 1967: "The amount of money vis-a-vis employment is not impressive. You could say that one job has cost so many hundreds of thousands of dollars when it should only have cost several thousand dollars" (quoted in Jenkins, 1976:48).
Studies of the Indonesian taxation system by several leading public finance economists lend weight to this conclusion. For example, a report by Musgrave and Musgrave (1974:89) concluded that:

The present system of accelerated depreciation and investment allowances for firm expansions together with capital import duty exemptions for new firms strongly biases the system in favour of the capital-intensive operation. (my emphasis).

A similar conclusion is reached by Peacock and Shaw (1973). In spite of all this, the argument still prevails that if Indonesia is to continue to attract foreign investment and technology it must offer incentives broadly similar to those of other capital-importing LDCs.19 Hence the regulations have remained basically unchanged since their introduction over a decade ago.

The effect of these incentives on relative factor prices and consequently capital intensity is not quite as straightforward as is commonly believed. In the case of some incentives, the bias towards capital intensity is unambiguous. These include the exemption from duty on imported capital goods in the presence of general import duties (the case in Indonesia), and investment allowances, whereby the concession is directly related to the amount of capital invested. Other concessions are in theory scale and technique-neutral, but in practice tend to advantage large capital-intensive firms. For example, in principle tax holidays benefit all firms (especially those with quick-yielding investments), but since smaller firms are excluded from this concession, in practice they assist mainly the larger firms.20 Similarly, exemption from

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19 This was essentially the view put to the author in an interview with the Chairman of the BKPM, Drs Barli Halim (Rice and Hill, 1977:16).

20 However, it should be noted that Indonesia's concessions are at least available to all firms. This is not the case in some LDCs. For example, in Thailand only mills with 500 or more looms obtain 'promotion certificates' (Santikarn, 1977:60-65).
duty on imported raw materials mostly benefits larger firms in the weaving industry because these are the major users of synthetic fibres (most cotton yarn is produced domestically).

Perhaps the most contentious incentive is the accelerated depreciation allowance, which allows firms to depreciate equipment over a shorter period than its economic life. It is mistakenly argued by some that this also imparts a capital-intensive bias. It is not necessary to pursue this issue in detail, but in fact a neutral depreciation policy would allow immediate write-off of all assets by treating them as an expense in the year in which they were incurred. By not allowing immediate write-off, firms are disadvantaged because the present value of future discounted depreciation streams are less than the current purchase price of the machine. Thus, accelerated depreciation allowances merely redress the initial bias against capital intensity, which arises because firms are not permitted to treat expenditure on capital equipment as an expense.  

5.4.3 Labour Regulations  
Workers in the modern industrial sector of developing countries constitute a small relatively well-off group compared to those who derive their earnings from agriculture or the urban informal sector. It is widely believed that this privileged position results in part from government policies aimed at improving their welfare. These policies often stem from an unthinking adoption of western labour legislation but can be implemented only in an LDC's modern organised sector. They include minimum wage and social security legislation, and

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21 This argument, whilst rarely referred to, is elaborated in some detail by Brown (1948), Smith (1963) and Swan (1976). Note that it is not applicable in the case of borrowers obtaining funds at negative real interest rates. However the effect of interest rates will be discussed separately in Chapter Six.

22 For a comprehensive examination of the government's manpower policies and the industrial labour market in Indonesia, see Manning, 1979:155-174.
regulations regarding termination of employment and working conditions. In the case of Indonesia one observer has argued that:

Several aspects of present labour laws and regulations tend to convert labour from a variable to a fixed cost and make it easier to use machinery rather than men. ... These laws and regulations ... have a significant impact on investments in the modern sector (Timmer, 1975:15).

It will be argued in this section that the Indonesian labour market is relatively unregulated. To the extent that regulations do have some impact, in many cases the firms most affected tend to be the medium-sized ones. Small firms with low wages and high levels of absenteeism and labour turnover evade the regulations since their hiring and employment practices are more akin to those of the informal sector. Large capital-intensive firms offer relatively good working conditions, which are frequently superior to those prescribed in government regulations.

Assessment of government manpower regulations is complicated by two factors. First, many regulations were drawn up in the colonial period or the early years of independence and most of these, whilst theoretically still in force, have never been implemented in a systematic manner. In their present state they are quite unenforceable. For example, part of the Dutch civil code still in force states that workers, whether paid on a daily or piece-rate basis, should continue to receive their average daily income if sick for 'rather a short time.'23 A second difficulty is that the government cannot enforce most regulations because of a shortage of officials. A 1968 United States Bureau of Labor Statistics study in Indonesia noted that:

Enforcement of labour regulations is impeded by low budgetary allotments and a shortage of qualified personnel.... As a consequence,

23 Labour regulations are explained in detail in the monograph from Padjadjaran University Law School (1974).
the application of labor legislation is restricted almost entirely to large foreign-owned concerns (quoted in Padjadjaran University Law School, 1974:7).

Since the late 1960s implementation of regulations has been extended somewhat, but hardly beyond the modern sector. It is not uncommon to find quite substantial firms in flagrant violation of labour regulations and agreements. 24

5.4.3.1 Minimum Wage Legislation

For some years the government has been moving toward the establishment of a national minimum wage, with variations by region and sector. These wages are set by regional wage councils, and then forwarded to the Department of Labour in Jakarta for approval. In theory, they are determined with reference to minimum physical needs. However, the government is approaching the issue with considerable caution. In practice due regard is paid to wage levels prevailing in the market and the potentially adverse effects on employment of forcing up wage rates too quickly (McCawley and Manning, 1976:44-48).

The minimum wage for textiles in West Java for the years 1974-1977 was constant at Rp 125 per day. In Central Java the minimum wage set for the public sector has been intended as a guide to desired levels in the private sector. The minimum from 1973 to 1975 was Rp 125, in 1976 increased to Rp 175. These wages are far below those paid by foreign and large domestic firms, hence these firms are unaffected by the regulation. The impact on small firms is also limited: many are unlicensed and, since the majority are located in rural areas, enforcement is difficult (government departments only

24 For example, one newly established modern plant in West Java was paying its weavers the (1978) regulation daily wage of Rp 360, but for 9½ hours work instead of seven hours. For overtime, the hourly wage should increase by 25 percent, so for 9½ hours the wage would be Rp 520 or 40 percent more than that actually paid.
have branches down as far as kabupaten capitals). Moreover, wages in small firms are determined on a piece-rate basis, so it is very difficult to enforce a minimum daily wage. The only firms that might be affected are those large enough to attract the attention of the government, but small enough to be in the low wage sector, that is, the small-medium firms. But even for these, major enforcement problems arise, and many firms evade the regulation.  

5.4.3.2 Termination of Employment

This is perhaps potentially the most serious inhibition to employers hiring additional labour. Labour Law No. 12/1964 states that a permanent employee may not be dismissed without the approval of a regional body (Panitya Penyelesaian Perselisihan Perburuhan Daerah, or P4D) set up to consider such cases. This is usually a mere formality if the employee has a poor record of attendance or low productivity, both relatively rare occurrences in well-paid modern sector firms. Moreover, for probationary workers no such approval is required. Whilst in theory the maximum period of probation is three months, in practice this is often extended.

However, if the dismissal of 10 or more employees is contemplated, the procedures are more complicated. Approval must be obtained from the central body in Jakarta (P4P). If the employees are being dismissed because the owner wishes to introduce a more capital-intensive technology, approval may be a lengthy process with compensation payments possibly required. Because the weaving industry has expanded so rapidly since 1966

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25 In 1976 when the minimum daily wage in the government sector in Central Java rose, several firms admitted to increasing the nominal wage but discontinuing food and drink supplements. In some cases these had been equivalent to as much as Rp 50 per day.

26 Most large firms set production targets which they regard as the minimum required output. Each time an employee's weekly output falls below this level he is given a peringatan (warning). Three peringatan in one year are considered sufficient grounds for dismissal.
this problem of technological displacement (at least in the modern sector) has not yet arisen. As its growth rate slows but the pace of mechanisation continues, this issue may arise for weaving as it has already for other industries.

5.4.3.3 ASTEK

ASTEK (Asuransi Tenage Kerja) is the government's social security and workers compensation regulation which took effect in January 1978. It provides a wide range of benefits for workers, including compensation for industrial accidents, an old age pension and a form of life insurance. Sickness benefits are envisaged also. Funds for the scheme are to be provided by both employer and employee, but mostly by the former. The employer pays the premium for accident insurance, an old age pension, and life insurance. In all, the employer's contribution amounts to 10.9 percent of the weaver's base wage. The employee is required to contribute one percent of his wage to the old age pension.

The regulation is to apply only to firms with a workforce of 100 or more, or a monthly wage-bill of at least Rp 5 million. In theory, it could increase the cost of labour to weaving factories by as much as 11 percent. In practice it will be less than this because the premiums are levied only on the base salary and because most medium and large firms already provide some social security benefits. Nevertheless, the effect will be to increase the cost of labour significantly. It will be particularly severe on medium-sized firms with, say, 100 to 250 employees. First, they are being forced to suddenly increase their social welfare provisions up to those of the larger firms. Secondly, in medium firms, which employ more labour-intensive techniques, labour costs constitute a higher proportion of total costs than is the case of firms employing more capital-intensive techniques. Hence the premium levied on these medium firms will be relatively higher.
It is too early to predict the effect of the regulation. Most owners of medium firms interviewed were vehemently opposed to it, saying they would try to evade it and, at the first opportunity, would adopt more automated technology. There is ample scope for evading the regulation: the size of the workforce could be understated; firms could be split up so as to have a workforce of fewer than 100; hours of work could be lengthened and the number of workers reduced; the number of shifts could be reduced. On the other hand, ASTEK has been in preparation for some time, and a bureaucracy has been established to implement it. Clearly it is likely to be more effective than much of the labour legislation prepared in the 1950s and 1960s, which is now hardly in force.

5.4.3.4 Other Labour Regulations

Several other Labour regulations place some restriction on employing labour or increase its cost. Act No. 1/1951 stipulates a maximum working day of seven hours (six hours for night work) and 40 hours per week. A recent regulation requires the payment of penalty rates for night and weekend work. These regulations led Peacock and Shaw (1973:449) to argue that:

In Indonesia, multi-shift operations are discriminated against by labour legislation which imposes high fixed costs to marginal employment.

The effect of these regulations should not be exaggerated, however. The penalty rates are not onerous, and applications by firms for an eight hour day are granted as a matter of course. In any case, some firms which would be prepared to operate three shifts of eight hours each, instead work two shifts of about 11 hours at the request of their employees, who see it as an opportunity to increase their daily earnings.

27 Several firms were in fact contemplating this possibility, arguing correctly that the marginal cost of a third shift was too great.
Restrictions are placed on the employment of women at night and children. Leave before and after child-birth is also prescribed. However, these regulations are rarely enforced outside the modern sector.

5.4.4 Government Programs to Assist Small-Scale Industry

Not all government policies are designed with reference to firms in the modern sector. In recent years several initiatives to assist small-scale industry have been introduced, the most important of which has been the small-scale credit program (see Chapter Six). Repelita III places considerable emphasis on small industry and foreshadows a number of additional support programs (see Indonesia. Departemen Penerangan, 1979:Chapter 10). In this section it will be argued that however well-intentioned the non-credit programs are, they make a negligible contribution to the development of small-scale weaving in Indonesia.

5.4.4.1 BIPIK

BIPIK (Bimbingan dan Pengembangan Industri Kecil, or the Guidance and Development of Small Industry) is the most important of the non-credit programs to assist small-scale industry. It was launched in 1975 to give training to small firms in technical, commercial and managerial fields. Workshops and seminars throughout Indonesia are organised under the scheme. In the case of the textile industry, several Textile Service Centres (Pusat Pelayan Tekstil, or PPT) have been established, including one in West Java (Majalaya) and two in Central Java (Klaten and Pekalongan). Additional centres are planned for East Java and North Sumatra. These centres are to co-ordinate assistance to small-scale textile firms under the program.

It is too early to evaluate BIPIK adequately. It is a very ambitious program given its limited financial and manpower resources, because it must cover all provinces and most light

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28 The program had a budget of Rp 1.2 billion (a little under $3 million) in 1976, increased to Rp 1.7 billion (about $4 million) in 1977.
industries. Clearly, there is a distinct possibility that the mistakes of government programs to assist industry in the early 1950s will be repeated (see Chapter Three). The benefits of concentrating on two or three industries in a small number of provinces are obvious enough, and understood within some sections of the bureaucracy. However, political imperatives override sound economic considerations.

Apart from too few resources being spread too widely, the content and organisation of the program are not always appropriate to the needs of small firms. At present many of the courses are given by outsiders, who then move on to another centre. However, advice and encouragement regarding, for example, product innovation need to be of a continuing nature. Failures are to be expected and, unless advice continues to be available, small risk-averse weavers will be inclined to revert to previous methods. If this happens, the benefits of such potentially useful courses as dye techniques and pattern design will be lost.

In addition, some of the courses (eg. on 'management techniques' and 'motivating employees') tend to be far too abstract and removed from the real needs of the participants. The fact that these courses may be given by foreigners and in English - under the UNIDO program to promote the small-scale textile industry in Indonesia - further reduces their effectiveness. At one stage during fieldwork a week long loka karya (work-shop) was being held in the district in which we were conducting interviews. The foreign lecturer had had some experience in other LDCs and approached his task conscientiously. However, in the same city lived perhaps Indonesia's best known and most innovative hand loom weaver. An outspoken man who is very concerned with the socio-economic implications of the

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29 The industries specified are food and agriculture-related activities, textiles, building materials, timber, leather, metal-working and all handicrafts.
demise of hand looms in the district, he was not involved in the work-shop. On several occasions he has expressed a desire to become a consultant in the BIPIK program, whereby for a modest salary (a fraction of that paid to foreign consultants) he would act as an adviser to local hand loom weavers. His services have not been requested, even though he would be far more effective than an outsider.  

5.4.4.2 Policies to Promote Labour-Intensive Techniques

The government has adopted protective measures for labour-intensive techniques in some industries. In the kretek cigarette industry a virtual ban has been placed on mechanisation, and the excise duty on white cigarettes is higher than that of kretek. A differential sales tax has been introduced in the soft drink bottling industry, according to the technique of production used. By contrast, the government has ignored persistent requests for assistance from hand loom and small power loom producers.

There are several possible explanations for the policy differences between industries. The differential duty was probably imposed in the cigarette and, to a lesser extent, soft drink bottling industries, because a fairly clear division exists between the capital-intensive, foreign-dominated

30 In several long conversations with the author he speculated on the reasons for his exclusion. He believes it is to do with the 'colonial mentality' of officials ("It seems I need a white skin and a British passport before I will be listened to"). Another possible reason is that he is a very strict Moslem and critic of government credit programs. (For additional notes on his firm, see Appendix 4.3.)

31 In soft drink bottling, the products of factories using automatic fillers carry a 20 percent sales tax, whereas for manual bottling it is 10 percent (see Lampiran Surat Keputusan Menteri Keuangan Republik Indonesia, KEP - 486/ MK/II/4/1974). In the cigarette industry, white cigarettes pay an excise of 40 percent, whereas that for kretek cigarettes is 10 percent (Booth and Tyabji, 1979:18).
sector and the labour-intensive domestic sector. Several foreign advisors in Jakarta were known to be advocating a differential sales tax in soft drink bottling in the early 1970s. The government adopted this policy shortly after the political disturbances of January 1974. In weaving the foreign/domestic division is less marked, and foreign-owned companies produce less than half the output of modern sector mills. The reasons for the ban on mechanisation in kretek are less clear, but if the government felt under pressure to slow down the pace of mechanisation in manufacturing, it was a logical industry to choose. Traditionally it has been a very labour-intensive industry, even more so than weaving which has had a mechanised sector for over 40 years. Moreover, Indonesia is the sole producer of kretek cigarettes. Hence policies can be introduced which may raise production costs, without fear of import competition (although kretek and white cigarettes are still substitutes to some extent).

5.4.4.3 A Reservation Scheme

In Chapter Three it was pointed out that during the period of Guided Democracy the government virtually guaranteed the existence of many small textile firms through the yarn allocation system. The change of policies with the new order government ushered in a period of decline for these firms. In recent years their representatives have been lobbying for the introduction of a reservation scheme, similar to that of the Indian government (see Chapter Two, section 2.4). In the past the Department of Industry has been reluctant to endorse such a policy. In a working paper prepared on the subject in 1974 it argued that:

If the government goes too far in directing and controlling the use of technology in order to maximise employment opportunities,

Two of the five foreign companies producing white cigarettes in Indonesia alone account for over half the output of white cigarettes. By contrast, all kretek firms are domestically-owned (Manning, 1979:209-210).
it will discourage investment in the private sector. If the government must approve the proposed technology in each factory expansion and each new project, there is a worry that investment will slow down and decline (Indonesia. Direktorat Jenderal Industri Tekstil, 1974:9).

There is no reason to believe that the Department has changed its thinking on this issue, but over the last five years the pressure to introduce some restrictions on the operation of large firms has been mounting. Not surprisingly, the Department has reacted by introducing several token measures. In its discussion leading up to Repelita III, it did recommend the introduction of a reservation scheme (Departemen Perindustrian, 1977:p.3). However, the types of cloth referred to - serviettes, cloth for hospitals and kain engkel - are all produced in very small quantities and rarely if ever by large firms. Moreover, it is only a policy (kebijaksanaan) of the Department and not a regulation (peraturan), so it has no legal force. In addition, some Department of Industry offices at the provincial level have, when issuing licences to firms, attached a suggestion (anjuran) that firms with automatic looms should not produce sarung. However, as in the case of the reservation scheme it is unlikely that this could ever be implemented, a fact which government officials realise. If the goods became profitable for large firms it would be very difficult to prevent them from switching over.33

5.4.4.4 Yarn Supplies

Yarn is now in relatively plentiful supply in Indonesia, although periodic shortages of particular counts still occur. The difficulties that small firms experienced in obtaining yarn after the repeal of the yarn allocating system in 1967 led

33 As one businessman remarked: "All I would have to do is tell them I could not repay my [state] bank loan unless I was allowed to produce these goods!"
to a policy of requiring that the huge state textile enterprise, P.N. Industri Sandang, reserve 10 percent of its total yarn output for these firms. This has never been systematically enforced, but the regulation still exists. Later, in April 1972, in response to complaints from small firms that they could not obtain sufficient working capital, the Minister of Industry issued a decree requiring that P.N. Industri Sandang was to give two months credit to all small and medium firms purchasing yarn from it.

These two regulations have had very little effect. The pricing and marketing policies of state yarn factories are confusing, and very few small and medium weaving firms are able to buy yarn directly from them. Minimum orders are normally required, the size varying according to the stocks of yarn the factory has on hand. In addition, it is not unusual for yarn traders to be offering the yarn at a price cheaper than that quoted by the factory to smaller customers (even allowing for the fact that the former is a cash price and the latter is on terms). A simple explanation of this apparently paradoxical situation could be that the pecuniary economies of bulk purchase accruing to traders exceed their profit margin. Whether it is this or the better connections they have with the management matters little as far as the effectiveness of the policy is concerned.

5.4.5 Other Government Policies

Several other policies are of relevance in discussing the government's attitude towards the weaving industry. By far the most significant of these is the exchange rate, but also of some relevance are the pricing and availability of public sector goods and services, and the general attitude of middle-level echelons of the bureaucracy towards firms.

5.4.5.1 The Exchange Rate

The pricing of foreign exchange is important because the Indonesian weaving industry in general and its capital-intensive
sector in particular are very import-intensive. It was argued in section 5.3 that many LDCs deliberately maintain an overvalued exchange rate. One effect of this is to reduce the price of imported capital goods (in terms of local currency) ceteris paribus, thus favouring capital-intensive techniques of production. The question of what is an appropriate exchange rate is complex however, and only some very general observations will be made here.

In recent years the exchange rate has become a contentious issue in Indonesia. Following the 1971 devaluation one government adviser observed that Indonesia was...

... the largest less developed country with an open relatively uncontrolled foreign sector and a realistic exchange rate (White, 1972:125).

From 1971 to 1978 the rupiah was tied to the US dollar, but Indonesia's rate of inflation significantly exceeded that of the United States and most of its other major trading partners. For example, taking 1971 as a base, the consumer price index in 1977 was 311 in Indonesia (according to the Jakarta index) but only 150 in the USA. By 1977, the year in which most of our field work was undertaken and to which the price data in Chapters Nine and Ten refer, there were frequent calls for a devaluation to compensate labour-intensive activities. It was argued that those activities competing with capital and import-intensive firms were disadvantaged because the latter's inputs were cheapened as a result of the fixed exchange rate. Several prominent foreign economists supported this view. For example, Paauw (1978:56) concluded that during the 1970s

Overvaluation of the rupiah [has] favoured the growth of the larger-scale capital-

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34 According to Repelita II, imports supply 99 percent of cotton used, 100 percent of synthetic fibres, 50 percent of weaving yarn, 96 percent of spare parts and accessories, 95 percent of dye-stuffs and chemicals and 99 percent of textile machinery (Indonesia. Departemen Penerangan, 1974:13-20).
intensive manufacturing firms, and generally promoted capital-intensive technology in manufacturing.

This argument is based on the purchasing power parity (PPP) approach. It maintains that because of the timber boom of 1972 and the OPEC oil price rises of 1973 and 1974, the equilibrium exchange rate is lower (in terms of rupiah per dollar) than it otherwise would have been. It is argued that using the PPP, relative to 1971, the rupiah had become greatly overvalued. According to one estimate this was by as much as 55 percent in 1978, calculated by weighting trading partner shares in Indonesia's exports (see Paauw, 1978:56). Hence, it is concluded, by holding the rupiah to the existing exchange rate, the government was creating a significant bias in favour of large capital-intensive firms.

What are the merits of this argument? Indonesia has been in an unusual situation with respect to its balance of payments in the 1970s because of the export boom and a rate of inflation in excess of that of its major trading partners. The PPP approach, normally a useful guide to likely future changes in the exchange rate, is of limited use in this case. The massive turnabout in Indonesia's balance of payments resulting from the rapid growth of the export sector has led to a fundamental change in the country's comparative advantage and, in the process, created problems of structural adjustment. Labour-intensive activities (e.g. hand and small-scale power loom weaving), which are in direct competition with import-intensive firms in the modern sector, have experienced difficulties. Yet these arise not from a policy of maintaining a deliberately overvalued currency but because of the export boom. 35

35 These issues are discussed in greater detail by Rosendale (1976) and in several recent BIES "Survey of Recent Developments". Indonesia is not the only country to face the problem of structural adjustment necessitated by the rapid growth of the export sector. Australia has also experienced similar problems since the mining boom of the late 1960s (see Gregory, 1976).
Hence, whilst some writers have invoked the PPP approach to argue that the rupiah has been overvalued, the most important point is that Indonesia does not correspond to the stereotype 'mould' in section 5.3 of an LDC whose government deliberately maintains a disequilibrium (overvalued) exchange rate. Nevertheless, in view of the adverse effects of recent developments on labour-intensive activities, a case might be made for some form of adjustment assistance, on income distribution and employment grounds. In Chapter Ten the effects of an alternative exchange rate on the competitiveness of each of the techniques in the weaving industry will be examined.

5.4.5.2 Public Sector Goods and Services

There is great pressure on LDC (and developed country) governments to maintain low prices for the goods and services they provide. Much of this pressure emanates from the vocal, politically important and middle class urban minority, for products which are not usually consumed by the poor. Thus the failure of governments to implement full-cost pricing for these goods and services often results in large subsidies to well-off consumers. Similarly, because large firms are the main users of these goods and services in the industrial sector, they are also subsidised at the expense of small firms. The Indonesian government is committed in theory to the removal of subsidies to government enterprises. Whilst some of the more blatant examples of underpricing from the Guided Democracy era have been abolished, the practice still remains and shows no sign of disappearing.

A major area of underpricing is electricity. A study conducted in the late 1960s found that the State Electricity Corporation's (PLN) revenue was insufficient to cover even its running costs. Including capital costs, expenses exceeded revenue by between 80 and 140 percent. Moreover, the PLN was being run reasonably efficiently, hence the underpricing was not, as is frequently the case, to compensate for inefficient state enterprise management (McCawley, 1970:68-75). During the
1970s the government has moved little closer to implementing
full-cost pricing in electricity. For the weaving industry,
this represents a clear subsidy to firms using mechanised looms
at the expense of hand loom firms. Nevertheless, in practice
the benefit is not as great as it may at first appear to be.
The price of electricity is low, but installation costs are
very high. In addition, most large firms have installed their
own generating capacity because of the significantly higher
night rates charged by the PLN, and its erratic service.36

Conversely, users of generators benefit from the fact that
the price of oil products is heavily subsidised. Recently
the value of this subsidy has increased enormously because of
the government's reluctance to take politically unpopular
decisions: fuel price rises for 1977 and 1978 were deferred
because of the general election and presidential election.
Finally, the devaluation automatically raised the (rupiah)
value of the subsidy. The result is that for 1978/79 the
subsidy was Rp 197 billion (about $300 million); for 1979/80
it will be Rp 350 billion (about $550 million), even though
prices were raised in 1979. Furthermore, diesel oil constitutes
more than half the net subsidy given to all oil products.
Whilst a case may be advanced both on equity and environmental
grounds for subsidising the other main oil product to be sold
at a loss (kerosene), no such argument exists for diesel
products (Booth and Tyabji, 1979:20-25). It is widely believed
that numerous other state enterprises receive considerable
subsidies, although detailed evidence is unavailable (limited
evidence is provided in Appendix 5.2).

5.4.5.3 Middle and Lower Echelons of the Bureaucracy

Writing on agriculture under the old order government,
Penny and Zulkifli (1963:1020) argued that "the economic scales
have traditionally been weighted in favour of the estates" as

36 One estimate is that for West Java about 78 percent of all
electricity consumed in the province's textile industry comes
from the mills' own generators (Indonesia. Dinas Perindustrian
against smallholdings, and an important element in this was that "estates have the sympathy and understanding of government". A similar attitude applies in the new order government's policies towards industry. The power of the Department of Industry itself is limited. Unlike the state commercial banks, the Taxation Department and the Investment Co-ordinating Board, it is not responsible for the distribution of government largesse. Its main influence derives from the fact that any application for government benefits must be accompanied by evidence that the firm is licensed. This means that virtually all medium and large firms must update their licences annually, which in most cases is a mere formality. For small firms it is a different matter. Unless they wish to borrow from state banks or take part in such schemes as BIPIK, there is little incentive to renew their licences. Periodically, local offices attempt to ensure that licences are updated, but this is confined mainly to urban areas.  

The Department is caught in the very real dilemma over what type of industrial strategy ought to be pursued, and how the issues of fostering pribumi entrepreneurship and selecting 'appropriate' technology might be tackled. At the provincial and kabupaten levels especially, there is considerable sympathy for the plight of small textile firms. There is some hostility towards the allegedly exploitative role of Chinese traders and the belief that the unhindered operation of the market inevitably leads to the demise of the 'small man'. During the orde lama it was the Department of Industry which allocated yarn under the quota system. It could hardly be expected that the propensity for bureaucratic intervention would disappear quickly. On the other hand, the Department must espouse the government's aim of rapid economic development. Large modern factories are visible evidence of modernisation, hand loom and old power looms reminders of 'backwardness'. It is this sort of fallacious  

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37 This of course is a major reason why industrial statistics on small-scale and cottage industry are poor.
reasoning which in part explains curious decisions such as the one to ban the import of second-hand machines (see Appendix 5.1). Another factor is the predominance of engineers, with their emphasis on maximising physical labour productivity, in the upper echelons of the Department.\textsuperscript{38}

As a result of this dilemma over the type of industrial strategy to be pursued, the Department frequently issues contradictory or unenforceable regulations in an attempt to make concessions to both sides. For example, in closing off certain sections of the textile industry to new factories in 1975, several exceptions were announced. These included pribumi-owned firms, investment in labour-intensive activities and the introduction of new technology not yet in use in Indonesia, including (the very capital-intensive) jetlooms. The contradictions in this regulation are readily apparent. The second and third exceptions are in direct conflict with each other. The first is as unenforceable as programs in the 1950s were which aimed to foster pribumi entrepreneurship, such as the benteng program (see Chapter Three).

Thus on balance the Department has some recognition of the problems facing small-scale industry, but has yet to devise any creative solutions. Its programs of assistance to this group are either negative (reservation schemes), unenforceable (yarn availability) or token gestures (BIPIK).

5.4.5.4 Miscellaneous Policies

In conclusion, three minor policies should be noted. First, some governments supply land to small and medium firms at a subsidised or even nominal rental, a benefit not normally available to large firms. This concession is usually made available by second level (kabupaten/kotamadya) or lower governments. For example, one hand loom firm in rural Kulon

\textsuperscript{38} The importance of this point should not be exaggerated, but fully two-thirds of the 48 senior officials in the Department of Industry who have received tertiary education are engineering graduates.
Progo was renting 600m$^2$ of land for Rp 225 per year from the village authorities. The value of the land was approximately Rp 450,000 and a market rental would have been at least 10 percent of this figure. In cities some firms are given a hak sewa (right of rental) by the municipal government at below market rates.

Secondly, government purchases of cloth for its own requirements are substantial, and considerable scope exists for Departments to order cloth from labour-intensive firms (or co-operatives, representing them). Much of the cloth needed is fairly coarse, low and medium quality drill, which is well suited to these firms. During the orde lama the military used to place orders with hand loom firms but this practice has since discontinued (Sadli, 1974:370-371). There are administrative obstacles to such a scheme, but it would be an effective means of assisting small firms, particularly if orders were placed during the off season.

A third policy tool is that of tariffs on final textile products. The textile industry now receives heavy protection, and the import of some cloth is prohibited (eg. printed fabric in competition with batik). Some argue that heavy protection to import-substituting industries mainly benefits modern sector firms because they are the firms most likely to be competing with imports. However, this argument does not apply to the weaving industry, where imported cloth of all quality is available.

5.5 Conclusion

What are the main conclusions to be drawn from this analysis of the Indonesian government's industrial policies? Broadly speaking, the policies are similar to the generalised propositions about LDC government behaviour discussed in section 5.3. Relative factor prices have been distorted. Scarce economic resources are directed mostly to modern sector firms. This conclusion is strengthened by our findings in Appendix 5.1 (on prohibiting the import of used machinery) and
Chapter Six (on the operations of state commercial banks). Nevertheless, there are many contradictory elements in the government's policies, especially at the implementation stage. The Indonesian government's policies are probably no worse than those of many other LDC (or western) governments.

To summarise the effect of these policies: First, most of the investment incentives encourage the adoption of more capital-intensive techniques because they cheapen the cost of capital or exclude small labour-intensive firms. However, it is fallacious to argue that accelerated depreciation allowances are a bias towards capital intensity. Also, there is such wide-scale tax evasion that the nominal benefit (and therefore, the distortion) of the incentives is less than the actual. Secondly, labour regulations have an effect similar to those of the tax incentives, in that they raise the price of labour relative to capital. Nevertheless, they are not comprehensive and impinge only on firms in the modern sector. This, combined with the weakness of trade unions, means that labour market distortions brought about by the government are relatively minor. Thirdly, despite many assertions to the contrary, the government has not maintained a deliberately overvalued rupiah in the 1970s. The rapid growth of the export sector has created structural problems in the economy which have affected small labour-intensive firms adversely, but for most of the decade a devaluation would have been inappropriate. Fourthly, many government goods and services are provided at a loss, amounting to an effective subsidy to users which, in the industrial sector, are mostly large firms. Finally, there has been little in the way of positive programs to assist small-scale industry, although there are benefits in being 'neglected' by the bureaucracy.
APPENDIX 5.1

A NOTE ON THE PROHIBITION OF IMPORTED SECOND-HAND TEXTILE MACHINERY

1. Introduction

In 1974 the Indonesian government decided to prohibit the import of second-hand textile machinery. Since 1975, firms have not been permitted to include used machinery in applications to the BKPM for investment incentives. These decisions are surprising for several reasons. First, there is much discussion regarding the relevance to LDCs of 'intermediate' technology. Machines which are economically obsolete in high wage economies may well be appropriate to labour-abundant LDCs. Secondly, many studies of industrial entrepreneurship emphasise its evolutionary nature. Firms may begin as small family enterprises and gradually expand the scale of their operations. They rarely purchase new machinery. Thus, any decision which pushes up the price of second-hand machines inevitably hinders the growth of small firms. Thirdly, in its statements on industrial policy, the Indonesian government places great emphasis on the development of the prihumi business sector and weak economic groups (golongan ekonomi lemah). Barely a week passes without the remarks of a senior government official on the importance of this issue being reported in the press. Yet by denying small firms access to cheap used (imported) machines and taxation benefits, the government is harming the very group of firms for which it professes great concern. Finally, the decision is all the more puzzling because it was apparently not taken to protect the domestic capital goods industry, which in any case is fairly small. In fact, the decisions seem to have been taken for reasons of administrative convenience and an excessive preoccupation with the symbols of modernisation.

Indonesia is by no means the only LDC to prohibit the import of used machinery. Other countries in Asia (eg. Pakistan and Taiwan) have adopted this policy, and several more disapprove of their use by foreign firms (Little, Scitovsky and Scott,
1970:57). This appendix examines the reasons for the decisions and some of their ramifications. As an example of the political economy of decision-making in an LDC, it demonstrates very clearly how institutional and prestige factors can easily override strictly economic considerations.

2. The Importance of Second-Hand Machinery

2.1 Evidence from LDCs

Second-hand machinery has played an important role in the industrialisation of many countries, although little comprehensive data exist for LDCs as a whole.¹ The significance of 'capital-stretching' (of which one element is used machinery) in LDCs and Japan was discussed in Chapter Two (section 2.3). Table 5.1 indicates that even in the 1950s second-hand machinery was in wide use in Japan. It also shows that there was a strong

<table>
<thead>
<tr>
<th>Firm Size (number of employees)</th>
<th>1954</th>
<th>1955</th>
<th>1956</th>
<th>1957</th>
<th>1958</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 9</td>
<td>48.8</td>
<td>40.2</td>
<td>34.3</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>10 - 19</td>
<td>44.1</td>
<td>40.8</td>
<td>29.9</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>20 - 29</td>
<td>39.5</td>
<td>34.3</td>
<td>28.7</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>30 - 49</td>
<td>35.0</td>
<td>28.9</td>
<td>26.1</td>
<td>26.8</td>
<td>26.5</td>
</tr>
<tr>
<td>50 - 99</td>
<td>31.5</td>
<td>22.0</td>
<td>22.3</td>
<td>21.9</td>
<td>20.9</td>
</tr>
<tr>
<td>100 - 199</td>
<td>23.0</td>
<td>16.3</td>
<td>16.8</td>
<td>14.5</td>
<td>13.8</td>
</tr>
<tr>
<td>200 - 299</td>
<td>15.2</td>
<td>9.1</td>
<td>9.9</td>
<td>9.3</td>
<td>10.0</td>
</tr>
<tr>
<td>300 - 499</td>
<td>13.9</td>
<td>10.1</td>
<td>9.1</td>
<td>7.4</td>
<td>7.6</td>
</tr>
<tr>
<td>500 - 999</td>
<td>11.2</td>
<td>5.2</td>
<td>4.2</td>
<td>4.6</td>
<td>6.3</td>
</tr>
<tr>
<td>&gt; 1,000</td>
<td>4.6</td>
<td>4.7</td>
<td>4.9</td>
<td>3.3</td>
<td>3.1</td>
</tr>
</tbody>
</table>


¹ One estimate suggests that between 10 and 20 percent of the manufactured capital stock in LDCs is supplied by imports of used machinery (quoted in Smith, 1974:264).
inverse relationship between the size of firms and the percentage of used machinery in fixed capital investment. For small firms as much as one-third or more of their total fixed capital investment was in the form of used machines.\(^2\) Several other studies of LDCs also draw attention to the importance of second-hand equipment in the manufacturing sector. For example, Pack (1973:32) concluded that in the case of Kenya:

Almost all plants, even those set up during the last five years, purchased at least some used equipment when production began and, in a number, almost all the direct processing equipment was used.

Also, Strassman (1968:207), in a 70 firm sample in Mexico and Puerto Rico, found that about half the Mexican and three-fifths of the Puerto Rican firms used second-hand equipment.

Few empirical investigations of the international trade in used machinery have been conducted. One exception is the study by Cooper and Kaplinsky (1974) into the trade of used jute machinery between England and Kenya. Because it is the only detailed study of its type, it is useful to review its findings. In general, the authors are far less sanguine than many about the benefits in practice of importing used machinery. The market for second-hand jute machinery is 'highly imperfect'; buying and selling occurs only sporadically; and, whilst dealers exist, they are not prepared to carry substantial stocks because of the risks and long waiting periods involved. Indeed for LDC manufacturers, whose knowledge of the international market and bargaining procedures may be limited, they conclude that whether or not they buy wisely is largely 'a matter of luck'. Moreover, they argue, there has been a tendency to ignore transportation and installation costs, and repair and maintenance problems. These are often more important in LDCs

\(^2\) Also, a rapid fall in the proportion of used machinery in total fixed capital is evident just in this four year period. Presumably this occurred because of the shift to more capital-intensive technology - induced by rapidly rising real wages - which is more difficult to acquire second-hand.
than in developed countries. Thus, in contrast to the enthusiastic approach of many, they conclude:

There are possibilities of saving investible resources by buying second-hand but it is also easy to make mistakes which lead to an inefficient use of investment and foreign exchange .... As far as general principles are concerned one has to be agnostic about using second-hand machinery in developing countries.... There are however a number of good practical reasons for being sceptical, rather than simply agnostic (Cooper and Kaplinsky, 1974:45-46).

2.2 Evidence from Indonesia

There is no information regarding the importance of second-hand machinery in the manufacturing sector in Indonesia as a whole, but several surveys give some indication of the magnitude of their use. Of the 42 mechanised firms in our sample, 14 had purchased second-hand looms (Table 5.2). However, this underestimates their effective importance for

<table>
<thead>
<tr>
<th>Type of Loom/ Size of Factory</th>
<th>Total Number of Firms</th>
<th>Firms Which Purchased Some Looms Second-Hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Non-Automatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 100 looms</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>50-99 looms</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>&lt; 99 looms</td>
<td>13</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Field research

Note: a Refers to second-hand looms as a percentage of total looms, in those firms which purchased some looms second-hand.
several reasons. First, the supply of used looms in Indonesia is relatively limited. Since 1974 their import has been prohibited. Moreover, the weaving industry was in such an undeveloped state until the late 1960s that the number of mechanised mills updating their equipment and disposing of their used looms during the 1970s was not great. Secondly, there is a strong incentive for large and medium firms to purchase new looms in order to qualify for taxation relief. Hence it is not surprising that of the firms using automatic looms none purchased second-hand machines. Amongst smaller firms second-hand looms are far more important. Of the firms possessing 50 to 99 looms almost half had bought used looms, and these constituted on average 80 percent of their capacity. For firms possessing fewer than 50 looms, almost two-thirds had purchased second-hand looms. Further evidence regarding the importance of used looms comes from five hand weavers in our sample who were seriously contemplating a switch to mechanised weaving. All five planned to purchase used looms initially.

Clearly, then, small power loom firms generally commence operations with at least some used looms. Most would have difficulty raising sufficient finance to purchase new machines. Moreover, there is always sufficient uncertainty about their initial prospects to make them reluctant to outlay a large investment in new machines. Thus, any policy which hinders the operation of the market for used looms and raises the price will adversely affect smaller weavers.

Limited additional evidence exists which suggests that the use of second-hand mechanised equipment is not widespread in the

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3 In addition, none of the five firms possessing less than 50 looms which had all been purchased new had bought their looms independently during the orde baru. Two are weaving co-operatives which bought their looms under the GKBI umbrella. The remaining three bought them under the small-scale mechanisation program of the 1950s (see Chapter Three) or in the early 1960s.
rest of the manufacturing sector, presumably because of the prohibition on imports and the late start in Indonesia's industrialisation. These two factors probably explain the otherwise surprising finding of a survey of Indonesia's manufacturing industry by Wells (1973b:68) in which only four out of 43 firms had some second-hand machinery in use. By contrast in the long-established inter-island shipping industry a flourishing market for second-hand ships exists, despite onerous bureaucratic controls (Dick, 1977:342-346).

3. The Reasons for the Prohibition

The prohibition on the import of used machinery does not apply to all industries because the Department of Trade leaves the decision up to the relevant Directorate-General. Other Directorates-General permit the import of used equipment subject to certain conditions - for example used motorised vessels may be imported - but in the case of textile machinery the ban has applied since December 31 1974 (Indonesian Commercial Newsletter, February 28 1975:10). Prior to the imposition of the ban, several other regulations existed regarding the import of used machinery, although enforcement was rare. These regulations included requirements that machinery be not more than eight years of age, that supplies of spare parts be 'guaranteed', and that the price should not be more than half that of new looms (Textile Asia, 6(1), January 1975). Then in June 1975 the Directorate-General issued a decree (Keputusan Ditjenteks, No. 084/Dir.J./VI/75, 2/6/1975) stating that henceforth applications to the BKPM for investment incentives could not be considered if second-hand machinery was involved.

4 The import of used ships was prohibited from 1972 to 1974, but apart from then their import is allowed subject to the following conditions: ships must be less than 12 years old (10 years if made in Japan), the minimum size is 1,000 deadweight ton, and 80 percent of the purchase price must be paid on delivery (Dick, 1977:342-345).
Official reasons for the ban are vague, but from conversations with government officials two main factors emerge. First, prior to the prohibition there was considerable underinvoicing on imported machinery. Duty was levied on the f.o.b. value of the machinery, which was understated in order that a lighter duty would be payable. Prohibiting the import of such machinery was thus an administrative convenience which would prevent this malpractice. However after 1967 this should not have been an important consideration because the new investment regulations expressly waived the duty on imported machinery. Nevertheless, not all firms apply for investment incentives.

A second and probably more important reason for the ban is the feeling, widespread among senior government officials, that used machinery which has been discarded by the West should not be imported by LDCs which are attempting to modernise rapidly and 'catch up' with the West. There are really two elements in this argument: First, there is the prestige factor, that hand looms and old power looms are symbolic of Indonesia's backwardness. Only new equipment should be imported as a visible sign of progress. The second is the belief that there must be something 'inferior' about machinery which has been discarded by other countries. This derives from the notion which has been labelled 'engineering man'. That is, techniques should be adopted which maximise labour productivity, regardless of relative factor endowments (see Chapter Eight, section 8.5).

Government officials were not alone in their view that second-hand machinery should not be imported. Several United Nations reports to the government had been advocating such a

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5 The import of used machinery also created problems for the banks. Bank officials allege that many businessmen obtained false invoices for machinery at inflated prices and used these as collateral for loan applications.
policy for some time. One such report (UNIDO, 1971) dwelt on the issue at some length. In recommending the prohibition of the import of used machinery ('except if such machinery is used for training and practice purposes'), the report pointed to the problem of obtaining spare parts. It also argued that older machines produce goods of inferior quality and may be more skill-intensive due to more frequent breakdowns. Further, in apparent ignorance of the fact that relative factor prices differ between high and low wage countries, it posed the question:

No machine is scrapped before its life unless it is uneconomical, otherwise why is the owner not reconditioning it for his own account? (UNIDO, 1971:56).

4. An Evaluation of Arguments for the Prohibition

What are the merits of the decision to ban the import of used machinery? A general objection is that it infringes on the economic freedom of private investors. Firms in the private sector should be allowed to choose whether they wish to buy new or used equipment from overseas. In the heavily regulated business climate of Indonesia however, arguments concerning economic freedom are not persuasive. Hence it is necessary to consider the validity of the other objections to the import of used machinery.

First, there is the issue of administrative convenience, of preventing firms under-invoicing for customs purposes and over-invoicing in connection with applications for bank credit. A first-best solution would be to rectify customs and banking procedures, but this is probably impossible in the short term. Nevertheless, the administrative convenience argument is not important. Allowing the import of used machines would not entail a great loss of customs revenue because most firms are already exempt from duty on imported machinery. The complaints of the state banks should not be taken seriously. Over-invoicing can also occur on machines purchased domestically. In
any case, it is of minor importance compared to other deficiencies in the banks' lending practices (see Chapter Six).

The second problem relates to spare parts and maintenance. This also is hardly a valid objection. Older weaving looms are generally of fairly simple design, and Indonesian mechanics are expert at keeping machines running (albeit frequently by unconventional methods!), hence repair and maintenance problems are unlikely to arise. Modern fully-automatic looms require more thorough maintenance but no such looms have been purchased second-hand from domestic or overseas sources to our knowledge. Similarly, spare parts are not the problem they were in the old. Motors and dynamos can be (and are) imported where necessary, and other parts can be obtained from metal-work shops. The fact that there are power looms made in Japan in the 1920s still in operation in Indonesia indicates that these are not major problems.

There is third, the fear that Indonesian businessmen will suffer in such transactions because of inexperience or imperfect

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6 An illustration of the dexterity of Indonesian mechanics is the interview reported by Wells (1973a:324) with a foreign businessman whose firm was introducing sophisticated equipment to replace its simpler machinery (which was nevertheless still in good condition). When asked what he was going to do with the old equipment, he explained that he was going to cut it up and scrap it. He would not sell it because 'some of these Indonesians can get any old equipment running'.

7 The experience of a firm which possessed 50 Indian-made looms is instructive here. To the owners knowledge, these were the only such looms in Indonesia, and importing spare-parts from India on a regular basis would have been difficult. Instead the firm supplied the specifications of all machine parts to a local metal-work firm, which then produced the parts as needed. This arrangement did mean that working capital (in the form of spare parts) was higher than might otherwise be the case, but only slightly so.
knowledge. The findings of Cooper and Kaplinsky (1974) suggest this argument may have some validity. However, their study is of limited relevance to the weaving industry because jute processing is a relatively small industry with a poorly developed second-hand machine market. In the case of textiles the market is well developed. Several North American firms specialise in the sale of used textile machinery. Personal communication with them revealed the availability of a wide range of machines at low prices. This is supported by the observation of G.K. Boon that there is much used textile machinery available in Europe and that...

"a good deal of the machinery in question is in excellent condition. It has become available because high-cost producers in the European Economic Community have been driven out of certain product lines by low-wage producers (quoted in Cooper and Kaplinsky, 1974:50).

The same is also true for North America and Japan.

More generally, the fact that firms may make commercially unwise decisions is not a justification for government intervention. In any case, if the government believes it must protect businessmen who import used equipment, there are more positive methods of rendering assistance. It would need only one or two officials in the Directorate-General of Textiles to monitor the textile machine market (eg. regarding price changes and the reliability of dealers), and then distribute such information to each kabupaten office of the Department perhaps twice a year. This would not involve an additional cumbersome bureaucracy. The Directorate already distributes circulars to these offices regularly, and businessmen contemplating an expansion of their productive capacity must first approach the kabupaten office for a permit.

Finally, there is the objection that Indonesia should not be importing used machinery when it has embarked on a period of rapid modernisation. This argument is devoid of economic content, although it is illustrative of the importance of
prestige in policy-makers' minds. Looms which are uneconomic to operate in high-wage economies may still be profitable in countries such as Indonesia. Moreover, the imported looms would be technologically superior to much of the weaving machinery currently in use, including hand looms, Indonesian-made power looms and the older Japanese looms.

5. The Effect of the Prohibition

Several theoretical expositions have sought to demonstrate the superiority of used equipment in terms of savings in costs and foreign exchange, and greater employment creation (eg. Sen, 1962; Schwartz, 1973). The effect on the competitiveness of each of the weaving techniques of the prohibition will be analysed in Chapter Ten below, by estimating the likely installed price for each technique if the policy were reversed. Clearly, one effect of the ban has been that second-hand looms in Indonesia retain their value surprisingly well. For example, non-automatic Suzuki looms with dobies, made in the 1950s, were still being sold for up to Rp 800,000 (almost $2,000) in 1977, whereas new models are about Rp 1.6 million. In the case of the inter-island shipping industry, Dick (1977:346) estimated that the effect of the ban imposed on second-hand ships (from 1972 to 1974) was to raise their price by about 25 percent.

Summing up then, the government's policies regarding used machinery have adversely affected small, labour-intensive weaving firms in three ways: they are forced to pay a higher price for such machinery; they are excluded from the investment incentives offered to the purchasers of new equipment; and the large firms against which they compete are able to command high prices when selling their old looms.

8 These looms are now rarely used in Japan and are frequently cut up for scrap metal. Hence their ex-factory price (ie. from the plant which is discarding them) would be very low. I am grateful to Professor Crawcour for this observation.
APPENDIX 5.2

THE ECONOMIC PERFORMANCE OF GOVERNMENT WEAVING MILLS

1. Introduction

This chapter has discussed the role of the government in the weaving industry. The government is also directly involved in the industry through its ownership of several weaving factories. During fieldwork four of these factories in three provinces were visited. Information gained from interviews with mill managers and the provincial boards of management, and examination of company records constitute the basis of this appendix. Its purpose is to examine the economic performance of these mills. The main argument is that by usual economic criteria there is nothing in their record to suggest that the promotion of public enterprises in the weaving industry is a sensible economic strategy. However, political considerations will ensure the continued existence of these mills.

There is a paucity of published information on state enterprises in Indonesia, apart from a major study of the State Electricity Corporation (PLN) by McCawley (1971), and an investigation of the state-owned shipping company, Pelni, as part of a wider study by Dick (1977) on inter-island shipping. The government weaving mills differ in some respects from the PLN and Pelni. They operate in a fully commercial environment in competition with firms from the private sector. Also they are owned predominantly by provincial governments, whereas the PLN and Pelni are under the control of the central government. Nevertheless, in other respects there is much in common. The economic performance of most state enterprises is poor. There is also the unresolved issue of how much independence should be accorded to these enterprises on matters of organisation, management, and investment and pricing policies. In the words of McCawley (1978:24):

Ever since Independence, successive Indonesian governments have been experimenting with different methods
of regulation in an effort to find a successful way of balancing accountability against autonomy, unfortunately with only a little success.

2. History and Goals

There are 14 state weaving mills in Indonesia, owned either by the central government or by provincial governments, and total capacity is almost 4,500 power looms (Table 4.2). Most of these mills were established before 1966; several date from the colonial era. This has created problems, as many of them have proved ill-suited to the task of adjusting to the new commercial climate after 1966.

Official statements on the role of state enterprises by the new order government are not clear, although one goal emphasised in Repelita I was the government's desire to reduce the financial dependence on the state budget (Indonesia. Departemen Penerangan, 1969:53). In the case of weaving firms at least three main goals may be identified. First, they are expected to be a source of revenue to the government through the distribution of post-tax profits. These firms are singularly unsuccessful in achieving this goal. All but one of the four visited were incurring losses and were thus a drain on government resources (see section 3 below). Secondly, they are regarded as a means of extending pribumi ownership throughout the economy. This is a costly method of achieving an admittedly difficult objective but, as has already been emphasised several times, the sensitivity of the pribumi/non-pribumi issue in Indonesia cannot be overestimated. A more cynical view might be that state enterprises, rather than being a vehicle for increased pribumi participation in the economy, provide an opportunity for a whole range of commercial malpractices and government patronage. This will be discussed

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1 The formula for distributing profits used by one of the firms is typical of the arrangements made. For this firm, post-tax profit is distributed as follows:
- 55 percent to the provincial government
- 35 percent to investment reserve (cadangan modal)
- 10 percent to employees as a bonus.
further below. Thirdly, they have been established as a means of countering regional discontent with the central government. This was a more important consideration under the orde lama government than it has been since 1966. Most of the mills that were to be established under the Chinese aid program of the early 1960s were located in the Outer Islands (see Chapter Three). The mill at Garut, located in a strong Darul Islam region, reportedly received considerable government patronage during the 1950s and early 1960s because of the activities of this rebel group.

3. Economic Performance

Previous studies have drawn attention to the poor economic performance of state enterprises. In this section the economic performance of the four weaving mills is examined. Two pieces of information are presented. First, the performance of government firms is compared to that of similar private firms (employing the same technology), using a range of economic indicators. Secondly, additional financial information regarding their profitability is given.

3.1 Some Economic Indicators

Table 5.3 presents several indicators of the economic performance of the four state weaving mills in our sample, compared to all other firms using the same technique. The data are expressed in ratio form to facilitate direct comparison. All four mills used either fully-automatic (M₃) or semi-automatic (M₂) looms. The principal findings are as follows:

(i) Capital-output ratio (K/0). All government firms require more capital to produce a given unit of value added, and thus use capital inefficiently.

The PLN has low standards of technical efficiency and the price of electricity is above that of most ESCAP countries (McCawley, 1971:Chapter 13). In its 22 years of operation up to 1974 Pelni had yet to make a profit (Dick, 1977:202).
Table 5.3: Economic Performance of Government Weaving Mills, 1977

| Ratio of Government Firms to Private Firms, by Technique | Measures | | | | | |
|---|---|---|---|---|---|---|---|
| | KT | KM | KT | KM | 0/L | Labour costs | Labour hours per 1000m² |
| Technique M₃ | 1.59 | 1.02 | 3.44 | 1.98 | .28 | 1.61 | 1.26 |
| Technique M₂ | 5.38 | 1.66 | 18.01 | 5.14 | .52 | 2.58 | 1.88 |

Source: Field Research

Key:
- KT/0: the ratio of the current value of fixed and working capital to average monthly gross value added
- KM/0: the ratio of the current value of machinery to average monthly gross value added
- KT/S: the ratio of the current value of fixed and working capital to average monthly gross operating surplus (defined here as gross value added less labour costs)
- KM/S: the ratio of the current value of machinery to average monthly gross operating surplus
- 0/L: average monthly gross value added per full-time equivalent employee
This applies in particular to the two $M_2$ firms which required over five times as much capital to produce a given value added as did privately owned $M_2$ firms. The performance of $M_3$ firms is relatively better and in the case of the machinery-output ratio almost identical to other firms. The performance of the government firms is relatively worse if capital is defined to include all fixed and working capital ($K_T$) rather than machinery only ($K_M$). This is mainly because government firms frequently have unnecessarily large factory sites and buildings (see footnote 5 below) and carry large stocks of final goods owing to difficulties they have in competing with other firms.

(ii) Capital-surplus ratio ($K/S$). Although the economic meaning of this ratio is not always easy to interpret, it does demonstrate how the value added of firms is distributed between wages and surplus. Firms earning a relatively small surplus are by definition distributing most of their value added to wages, hence the capital-surplus ratio is high. Government firms are even worse performers according to this criterion. Thus they earn less value added from a given unit of capital than private firms, and most of what is earned goes to wages. Here also, the government firms are much poorer performers if all fixed and working capital is included, rather than just machinery.

(iii) Labour Productivity. Labour productivity (defined as value added per 'full-time equivalent worker') in government firms is well below that in private sector firms. For $M_2$ government firms it is a little over half that of the corresponding private firms, whilst for $M_3$ firms it is less than 30 percent. A major reason for poor labour productivity in government mills is that the ratio
of looms to operator is generally lower. This is partly the result of older and more mixed loomage, although even for newer looms it is lower. The data are a good measure of the profligate use of labour and inefficiency of these firms.

 Labour Use. Two measures of labour use are provided, labour costs as a percentage of total costs and labour hours per 1,000m$^2$ of cloth produced. As would be expected, labour costs as a percentage of total costs are higher in government firms, as is labour use per 1,000m$^2$. With more labour used to produce a given quantity of output and wage levels little if any below those in private sector firms (except for senior management), labour costs are much higher in government firms. In the case of the two $M_2$ firms they are fully 150 percent greater.

Thus by almost any economic criterion the performance of government mills is very poor. All are earning a surplus, by our definition of the term (that is, revenue exceeds running costs), but fixed and working capital costs have not been deducted. In fact, only one of the firms is near to covering all its costs.

3.2 A Case Study

Much additional evidence regarding the poor performance of these firms is available. The experience of one of the firms is particularly instructive, and will be examined briefly. In doing so, our purpose is not to add to the tales of corruption which are familiar to every serious observer of Indonesia. It is to demonstrate that not only are government firms usually poorly managed, but they also provide considerable scope for corruption and misuse of public funds.$^3$ This large factory was

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$^3$ Much of the information on the company's recent history comes from a report prepared by the recently installed management. Because of its controversial nature, it was necessary to check the report's authenticity with several outside sources.
established by Dutch interests in the 1930s, but has been under the control of a provincial government for many years. During the orde lama the firm was run at a profit. This was guaranteed by the yarn quota system, to which the firm had access by virtue of its ownership. Events after 1965 did not adversely affect the firm initially, as its trademark was well known. Gradually however, its financial position began to worsen as the management, saddled with aging machinery, had difficulty adapting to an increasingly competitive market environment.

By 1975 the situation had become serious enough for the provincial government to intervene, and early in the following year a new management was installed. This management instituted a new system of marketing involving the appointment of a sole agent, who would supply all raw materials and in exchange obtain the sole right of disposal of the output. However, it soon became apparent that this arrangement was being exploited for the agent's personal enrichment, and the deterioration in the firm's financial position accelerated. Raw material prices paid by the firm were above market levels, some non-yarn items being twice the usual price. The selling price, determined by the sole agent, soon fell below production costs. Later in the year the agent complained the goods still could not be sold, and demanded 'discounts' of 10 to 15 percent off the sale price. By the end of 1976 the position was desperate. The mill was losing about Rp 1 million ($2,500) per day, again making no allowance for capital costs. The provincial government again decided to intervene, although decision-making processes had slowed down because of the forthcoming general election of May 1977. It was anxious to do away with the marketing system, and attempted to arrange for the purchase of yarn on credit from PN Industri Sandang, and credit from a state bank. However, both parties were reluctant to participate in view of the poor commercial record of the firm. It was then decided to install a new management alongside the existing management. The existing manager was given the title of Chief Director (Direktur Utama).
and retained as an 'adviser', but he was to pass over all authority on financial matters to the new management (Kuasa Direksi, or Controlling Management). This arrangement still existed when we visited the factory in early 1978.

The new management faced an accumulated debt of Rp 700 million ($1.7 million), but was fortunate to be taking over with the busy Idul Fitri period approaching. The turnabout in the factory's performance, owing to the return of more prudent management and conventional marketing methods, was remarkable — and indicative of the extent of previous mismanagement. The losses for each semester (half year) in 1976 and 1977 were as follows:

<table>
<thead>
<tr>
<th>Period</th>
<th>Loss $^4$ (Rp million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976 Semester I</td>
<td>77</td>
</tr>
<tr>
<td>1976 &quot; II</td>
<td>158.4</td>
</tr>
<tr>
<td>1977 &quot; I</td>
<td>149.7</td>
</tr>
<tr>
<td>1977 &quot; II</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Two implications can be drawn from the recent history of this firm. First, as already noted, state enterprises are vulnerable to manipulation for personal gain and thus may become a drain on government revenue. Advocates of an extension of the public sector through the establishment of such enterprises must come to grips with this potential for abuse. Secondly, the 'external environment' of government weaving mills may not be the major determinant of their performance. The quality of mill management is obviously very important. We shall return to this issue in the following section.

Clearly, this firm is not fulfilling one function of state enterprises, that of contributing to government revenue. That

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$^4$ It was noted above that all state enterprises are earning a 'surplus'. The loss recorded for Semester II 1977 (the period from which our data in Table 5.3 are derived) is because of definitional differences, principally the inclusion of working capital costs in the firm's expenses.
this is a fairly general phenomenon can be seen from the financial position of a large group of textile mills (spinning and weaving) under the control of another provincial government. During the years 1973 to 1977, the financial flows between governments (central and provincial) and the group’s governing body were as follows:

<table>
<thead>
<tr>
<th>To Government</th>
<th>Rp million</th>
<th>From Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual management fee (Rp 100 million)</td>
<td>= 500</td>
<td>Due to continuing financial difficulties, the Department of Finance granted a subsidy of Rp 2,700 million in 1976</td>
</tr>
<tr>
<td>Occasional contributions to the government's</td>
<td>= 350</td>
<td></td>
</tr>
<tr>
<td>development fund (Dana Pembangunan Milik)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>= 850</td>
<td></td>
</tr>
</tbody>
</table>

Thus the contribution of (not to) the government over this period was a huge Rp 1.85 billion ($4.5 million), although the effective subsidy would have to take into account the facilities which state enterprises provide for governments (see footnote 5).

The group earned a small profit in 1973, and anticipated a similar result for 1977. For the years 1974 to 1976 a loss was incurred and thus no taxation paid. In addition, various other government benefits were provided to the group, benefits which in all likelihood would not be extended to private sector firms with a similar financial record. These included a large loan from the State Development Bank (Bapindo), and textile machinery from Japan and the U.K., with supplier's credit on generous terms. In fairness, no allegations of major corruption have been directed at the managing body. It appears that poor planning and an over-hasty expansion in the mid 1970s were the main reasons for the poor record. With these difficulties overcome, there is a good chance that the group will become profitable in the future. However, from the point of view of resource use, it matters little whether public funds are squandered because of 'honest mismanagement' or wilful abuse.
4. **The Performance in Perspective**

A useful framework for assessing the reasons for the poor performance of government mills is that adopted by McCawley (1971:457-468). He suggests that three sets of factors influence the performance of state enterprises. These are, first, 'objective' socio-economic conditions, such as the state of factor markets, trade and infrastructure, and community attitudes towards state enterprises; secondly, decisions taken externally to the enterprise regarding its investment and pricing policies, labour relations, and so on; and thirdly, the internal organisation and management of the firm itself. For the PLN McCawley (1971:458) concludes that...

... (a) the 'objective' socio-economic conditions and (b) the decisions taken externally to the enterprise were more important in retarding the growth of the industry than (c) the internal operations of the PLN itself.

It will be argued that the first two factors are also of considerable relevance in the case of the government weaving mills. However, the great inter- and intra-provincial diversity in factory performance suggests that the third factor is more important than it was in the case of the PLN up to 1970.

Objective socio-economic conditions for state enterprises in the orde baru are better than at any time since independence. Inflation has been under control for most of the period; internal and, to a lesser extent, external trade flows have been liberalised; shortages of raw materials and spare parts are no longer major problems; and a measure of order has been introduced into accounting and business procedures. In addition, during the late 1960s and early 1970s textiles was a sellers' market for power loom firms, although this has changed in recent years.

Conversely, state enterprises are still seen to some extent as a 'milch cow' by governments. This need not extend to massive corruption, but merely take the form of continuing
official exactions and burdens placed on the firms.\textsuperscript{5} Another difficulty they face derives from the transition from the 'welfare orientation' of the orde lama to the 'commercial orientation' of the orde baru. The economic environment towards the end of the orde lama period especially was chaotic and the price structure artificial. Obtaining a quota of yarn at low official prices - as government firms did - guaranteed survival. In exchange, government firms were expected to (and did) adopt liberal attitudes towards the size of the workforce. Despite the change in official policy towards state enterprises under the orde baru, the reorientation of goals is a difficult process and has in practice proceeded very slowly.\textsuperscript{6} This process has been even slower in the case of the weaving mills because most of them are under the control of provincial governments. There are inevitable lags in the adoption of new central government policies in the regions.

The second set of factors relates to decisions taken externally to the firm and over which it has little or no influence. This is also of some relevance to the government weaving firms. In the case of a provincial government controlling both spinning and weaving mills, the latter is required to purchase yarn from the former, and at official

\textsuperscript{5} Numerous examples can be cited. The firm discussed above had been forced to buy and maintain six substantial residences for government officials who were in no way connected with it, in the provincial capital over two hours drive from the factory. Sale of these properties would have contributed greatly to the urgently needed program the factory management had prepared for updating its machinery. In another case the provincial government had requisitioned a section of a factory for use as government offices!

\textsuperscript{6} In the words of one mill manager: "Originally this factory was established as a kind of welfare measure. Now the situation is different and we are supposed to make a profit. However, it is not easy to change from one role to the other".
This adversely affects the profitability of the weaving mills in two ways. First, some provincial government spinning mills have had considerable teething troubles, and hence their prices have not been competitive. Secondly, when sales of yarn are particularly sluggish, discounts (in the form of extended credit or lower prices) are offered to buyers other than government weaving mills. Thus to some extent losses in the spinning mills are being transferred to the weaving mills, which are prohibited from buying yarn from the cheapest source.

Another problem of the government mills is the sporadic and ad hoc manner in which additions are made to their stock of machinery. Often, very little planning and forethought is given to machinery acquisition. New machines are selected to satisfy bureaucratic arrangements (eg. machinery given under an aid project) rather than the factory's technical requirements. This leads to extraordinary situations, such as the case of one mill with less than 200 looms having no fewer than eight different models of looms, in addition to a great variety of preparation equipment. As a result, factory planning is a nightmare: different sets of labour : machine ratios must be maintained; performance targets must be set for each type of loom and for each type of cloth; and maintenance and spare parts difficulties arise. By contrast, a large private sector firm (eg. with 500 or more looms) would rarely have more than two or three different types of looms.

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7 An exception is made if the weaving mill requires yarn of a count not produced in the spinning mills. However, this constitutes a very small percentage of total yarn purchases.

8 Similar problems are present in the electricity industry. Owing in part to the diversity of suppliers under aid programs, there is little standardisation of generating units. Consequently, the scope for interchanging parts between units is limited, and if two units break down it is not possible to cannibalise one to fix the other (McCawley, 1971:164).
A further difficulty for government mills is the onerous bureaucratic tasks they must perform and their lack of commercial independence. Reference was made above to the fact that Indonesia has yet to resolve the accountability/autonomy issue as far as state enterprises are concerned. The management of state enterprises complain that many of their tasks are irksome and time consuming. Daily workers (tenaga harian) can be appointed only by the provincial board of management. For more senior workers (tenaga bulanan) the approval of the provincial government is required. Extremely detailed reports must be prepared and sent to the board each month. Finally, the mills are allowed little independence in marketing of their cloth or in the choosing the type of cloth to be produced.

Thus socio-economic conditions and external factors have considerable influence over the performance of state enterprises. However, there is sufficient variation in their performance to suggest that the third factor, the internal organisation and management of the factory, is the most important. An example of this is the quite remarkable turn-about in the company discussed above after the installation of new management. Further evidence is the comparative performance of two mills under the same provincial board of management, which had plants of similar technical specifications and produced a similar range of goods. One mill was relatively well managed and almost earning a profit (including all costs of production). The other had had management difficulties for several years, and a poor financial record. It was visited during August 1977 - a peak period in the demand for textiles - and even at that time it had almost 12 months stock of production on hand. Most firms regard three months stock as an upper limit.
CHAPTER SIX

CREDIT: A FRAGMENTED CAPITAL MARKET

6.1 Introduction

The previous chapter discussed a range of government policies which affects the selection of industrial technology in the Indonesian weaving industry. The government also intervenes in the capital market. Indeed, so extensive is its direct and indirect regulation that an analysis of government credit policies must be central to a discussion of the Indonesian capital market.

An understanding of the capital market and the structure of interest rates is an essential pre-requisite of a study in the choice of technology. It will be argued in Chapters Nine and Ten below that interest rates are the single most important variable in determining which technique is adopted by private investors. If real interest rates in the formal banking sector are low or even negative, profit-maximising private investors will naturally respond by choosing techniques which are unduly capital-intensive. 1 Similarly, a fragmented capital market, where firms outside the modern sector are excluded from formal credit sources, is one factor which contributes to the heterogeneous nature of the industrial sector in many LDCs. Small firms forced to pay very high interest rates may well be quite rational in continuing to use traditional technology. Reform of the capital market is the key to encouraging the adoption of appropriate technology.

Section 6.2 examines briefly the literature on credit in LDCs. It is generally argued that capital markets in most LDCs are highly fragmented, in part because of government credit

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1 Unless of course the general economic and political environment is not conducive to large investment projects. For example, real interest rates in Indonesia during much of the orde lama were negative, but few private investors were prepared to establish modern capital-intensive plants.
policies. There are imperfections in the capital market, owing to lack of information and the immobility of resources, but governments have intervened in the organised credit market and established disequilibrium interest rates. According to this view, the resultant non-price rationing excludes smaller borrowers and forces them into the high interest unorganised credit market. The remaining sections assess the relevance of this argument for Indonesia. Subject to several qualifications it is concluded that the propositions advanced in section 6.2 about capital markets in LDCs are applicable to Indonesia. Whilst it is not appropriate to describe the Indonesian capital market as dualistic, it is fragmented: large firms do obtain credit 'too cheaply'; the operations of the state banks are such as to restrict the access of smaller firms to the organised credit sector.

6.2 The Nature of Capital Markets in LDCs

Discussing the development of the banking system in newly independent countries, McKinnon (1973:70) observed that:

> With independence and the development of national banking in LDCs, [the] overseas colonisation of banks has virtually disappeared. It has been replaced, however, by a very similar neo-colonial banking system.... Again, the mass of small farmers and indigenous urban industry remain financially 'repressed'.

In much of the literature on credit in LDCs, it is argued that governments have hampered the development of financial institutions and thus retarded the process of financial integration in two ways. First, poor fiscal and monetary management have led to high and uncertain rates of inflation, a failure to expand the real money stock and 'undermonetisation'. The resultant flight from money to real assets has reduced the growth and absolute size of the financial system. Secondly, governments have set disequilibrium interest rates in the organised sector, which have further hampered the process of domestic financial integration. It has been possible
to set disequilibrium rates in part because the domestic capital market in many LDCs is what Myrdal (1968:2088) has termed an 'insulated market'. In contrast to the colonial era, the domestic capital market in many LDCs has been virtually closed off from the international capital market.

This chapter is concerned with the second set of policies, relating to government intervention in the organised credit sector. In many LDCs, it is argued, this intervention has taken the following forms. First, deposit rates have been set very low, sometimes negative in real terms. This has reduced the supply of loanable funds in the organised markets. Lenders, in seeking to 'escape from financial repression' (Shaw, 1973:89), either lend in the informal money market or acquire non-financial assets, both of which offer higher real returns. Secondly, governments have set interest rates to borrowers at very low levels, in nominal terms often little higher than those prevailing in developed countries, whilst in real terms frequently lower. In capital-scarce LDCs these rates are far below the opportunity cost of capital and any reasonable shadow interest rate. They are low not because of market forces or efficiency on the part of banks, but purely as a result of government regulation.

Several additional aspects of LDC government policies have hindered the operation of the domestic capital market, according to this view. Access to overseas sources of credit has been restricted. Foreign banks have not been permitted to establish branches or, if they have, their lending activities are controlled tightly. Permission to borrow overseas is difficult to obtain. Moreover, the operations of moneylenders

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1 In many LDCs, including Indonesia, the central bank has subsidised the operation of government banks. Hence the distortion may be 'one-sided', in the sense that high interest rates may be offered to depositors, but low lending rates still apply. Whilst increasing the supply of loanable funds, the distortionary effects of low lending rates remain, but the burden of financing these is shifted from savers to taxpayers.
in the informal credit sector are curtailed by interest rate ceilings and usury laws. There is, as Hla Myint (1971:329) notes, 'a traditional belief in the wickedness of moneylenders' because of their allegedly exploitative role and the fact that in many LDCs this function is fulfilled by non-indigenous groups.

Even in a perfectly competitive market differences in interest rates between borrowers are to be expected, because of differences in the real cost of lending (eg. between large and small borrowers). However, it is argued, the effect of these policies - which reduce the supply of loanable funds to the formal sector, increase the demand for them and necessitate the use of non-price rationing - is to discourage financial intermediation and limit the access of small firms to the formal banking sector still further. In the words of McKinnon (1973:73):

Paradoxically, cheap credit ... may not benefit the little man at all. Quite the contrary. It may effectively prevent him from competing for long term finance from the organised banking system.

Consequently, these writers maintain, small firms (and farmers) may well be adversely affected by cheap credit programs. Low interest rates ceteris paribus result in loan funds being even more scarce, and small firms are generally unable to compete with larger borrowers for these scarce funds. The latter have better political connections, unit administrative costs of lending to them are lower, and the risk of default is less (although this is not always the case). Thus, small borrowers are forced into what Shaw (1973) describes as the 'curb' market for their finance, whilst at the same time governments condemn the existence of this market and frustrate its operation. To be sure, some governments introduce small credit programs. But in most LDCs, it is argued, these are of little aggregate significance and only a tiny proportion of small businessmen are able to participate.
How relevant are these arguments in the case of Indonesia? This is the question to be addressed in the following sections of this chapter.

6.3 An Overview of Credit Sources in Indonesia

There are four major sources of commercial credit for Indonesian manufacturing firms: the state banking sector, foreign banks and other overseas credit sources, private domestic banks and the unorganised money market. Little is known about the magnitude of the latter but information is available regarding the relative importance of the first three credit sources (excluding other overseas credit), which together constitute the organised credit market (Table 6.1).

Table 6.1: The Composition of the Organised Credit Market, April 1979

<table>
<thead>
<tr>
<th>Source</th>
<th>Loans Outstanding (Rp billion)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Indonesia</td>
<td>1,916\textsuperscript{a}</td>
<td>35</td>
</tr>
<tr>
<td>State Commercial Banks</td>
<td>2,917\textsuperscript{b}</td>
<td>53</td>
</tr>
<tr>
<td>National Private Banks</td>
<td>391\textsuperscript{c}</td>
<td>7</td>
</tr>
<tr>
<td>Foreign Banks</td>
<td>300</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,524</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Bank Indonesia, Laporan Mingguan (Weekly Report), April 26 1979

Notes:

a Excludes credit to other banks, but includes credit to the state oil company, Pertamina, for payment of foreign currency loans. Hence, a good deal of Bank Indonesia credit is not 'available' to the private sector.

b Includes the State Development Bank, Bapindo

c Includes local development banks
The state banking sector is by far the most important of these, being responsible for 88 percent of the value of total loans outstanding in April 1979. The range of interest rates and other conditions of credit from these sources is very wide. Table 6.2 provides a summary picture of the domestic credit sources.

It should be emphasised that these sources refer only to commercial credit. Most firms finance a proportion of their operations through ploughed-back profits and other forms of self finance. Moreover, a network of informal financial channels exists in all business communities, and loans from close associates undoubtedly constitute an important element of industrial finance.

6.3.1 Foreign Credit Sources

These include foreign banks with branches in Indonesia, several non-bank financial intermediaries, direct overseas borrowing and overseas suppliers' credit. Interest rates range from about 9.5 to 15 percent per annum. However, the loans are usually denominated in a foreign currency and, owing to periodic devaluations of the rupiah, the effective rate is higher.

There are now eleven foreign banks operating in Indonesia, and their lending activities are strictly controlled by the government. They may establish branches only in Jakarta. For projects outside Jakarta - excluding the export sector - they may supply no more than one-half the loan funds, the remainder being supplied by a domestic partner (but foreign banks do not have great difficulty circumventing the regulation). The second source of foreign finance, direct overseas borrowing, refers to

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Several studies of Chinese communities in Indonesia have drawn attention to this fact. For example, in his study of the Chinese in Semarang in the 1950s, Willmott (1960:65-66) notes that loans from friends and relatives are common. Usually no interest is paid on these loans but they do incur future obligations of some kind. The same applies to the pribumi business sector, although it is probably less tightly-knit.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>State Banks</th>
<th>Private Banks</th>
<th>Unorganised Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interest rates (monthly)</td>
<td>0.90-1.5% (in recent years frequently negative real rates). Rigid interest rate structure imposed by Bank Indonesia</td>
<td>1.8 - 3% Interest varies according to collateral, loan period, urgency with which funds required, use of funds (fixed or working capital, or consumption).</td>
<td>Not required</td>
</tr>
<tr>
<td>2. Self-finance requirement</td>
<td>25%, except for KIK and KMKP</td>
<td>Usually not required</td>
<td>None</td>
</tr>
<tr>
<td>3. Grace period</td>
<td>Yes</td>
<td>Unusual - up to 6 months for very large loans</td>
<td>Usually none, unless associated with entrepreneurial activity or repayment in kind</td>
</tr>
<tr>
<td>4. 'Unofficial' payments</td>
<td>Widespread</td>
<td>None</td>
<td>Usually none, unless associated with entrepreneurial activity or repayment in kind</td>
</tr>
<tr>
<td>5. Collateral requirements</td>
<td>Strict; unless client has political leverage or koneksi, and KIK, KMKP schemes</td>
<td>Less rigid, more weight assigned to borrower's business reputation</td>
<td>Little</td>
</tr>
<tr>
<td>6. Loan period</td>
<td>Maximum 10 years (15 years Bapindo)</td>
<td>Usually short and medium term only</td>
<td>Usually short term, frequently less than 1 month</td>
</tr>
<tr>
<td>7. Waiting period</td>
<td>Often lengthy - many bureaucratic requirements</td>
<td>Usually quicker than State Banks</td>
<td>Short, often none if established commercial relationship</td>
</tr>
<tr>
<td>8. Purpose of funds</td>
<td>Strictly production, apart from (illegal) relending and consumption use</td>
<td>Mainly production</td>
<td>No restriction</td>
</tr>
</tbody>
</table>
all foreign firms, which by law are prohibited from borrowing in the Indonesian capital market, and other firms which borrow directly from banks overseas. The latter consists mainly of Chinese firms, the owners of which have access to the Singapore and Hong Kong capital markets. Finally, overseas suppliers' credit is important in import-intensive industries such as weaving. This source is by no means confined to very large mills because the expanding textile machinery industries in South Korea and Taiwan have adopted a liberal credit policy in order to increase their penetration of the Indonesian market.

6.3.2 The State Banking Sector

This sector comprises the Central Bank (Bank Indonesia), the five commercial banks and the development bank (Bapindo). Several industrial credit programs are run by these banks, the most important of which is the Medium Term Investment program (Kredit Investasi). This offers finance for fixed capital purposes up to a maximum of 10 years, with a four-year grace period. A 25 percent self-finance requirement exists, but many firms avoid this by putting forward supplier's credit or funds obtained from another state bank.

A complicated and rigid set of interest rates is set by Bank Indonesia. Table 6.3 provides a summary of real and nominal interest rates: the borrowing rate is that applying to firms for fixed capital investment, while the savings rate is for medium term deposits. For about half the period since

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4 Before 1978 the limit was five years, with a two-year grace period. In the case of Bapindo a maximum period of 15 years and grace period of six years have applied since 1969.

5 Lending rates vary according to the program, the size of the loan and the sector of the economy in which the project is located. Over the last decade the structure has been simplified and the range of rates narrowed. Since January 1978 the range for kredit investasi has been 10.5 percent to 13.5 percent, depending on the amount; for working capital the range is from 9 to 21 percent, depending from which of the 19 sectors the application is made; for small credit it is either 10.5 percent (fixed capital) or 12 percent (working capital). For details see Bank Indonesia, Statistik Ekonomi-Keuangan Indonesia (Indonesian Financial Statistics), monthly.
Table 6.3: Nominal and Real Interest Rates\(^a\), 1967-1978

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation(^b)</th>
<th>Deposit Rate(^c)</th>
<th>Lending Rate(^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nominal</td>
<td>Real</td>
</tr>
<tr>
<td>1967</td>
<td>113</td>
<td>72</td>
<td>-13</td>
</tr>
<tr>
<td>1968</td>
<td>85</td>
<td>48</td>
<td>38</td>
</tr>
<tr>
<td>1969</td>
<td>10</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>1970</td>
<td>3</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>1971</td>
<td>26</td>
<td>18</td>
<td>-8</td>
</tr>
<tr>
<td>1972</td>
<td>27</td>
<td>15</td>
<td>-12</td>
</tr>
<tr>
<td>1973</td>
<td>33</td>
<td>18</td>
<td>-15</td>
</tr>
<tr>
<td>1974</td>
<td>20</td>
<td>15</td>
<td>-5</td>
</tr>
<tr>
<td>1975</td>
<td>14</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>1976</td>
<td>12</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Inflation. Indonesia. Departemen Penerangan, yearly
Interest rates. Bank Indonesia, Statistik Ekonomi-Keuangan Indonesia (Indonesian Financial Statistics), monthly

Notes:
\(a\) for years in which interest rates were changed, the rate given is that which applied for most of the year
\(b\) As measured by the Jakarta price index
\(c\) For intermediate (12 month) time deposits
\(d\) For the textile industry
\(e\) January-September annual rate
1967 real rates to both borrowers and lenders have been negative, depending on the success which the government has been able to control inflation. However, effective rates to borrowers have been higher than these rates for two reasons. First, a range of official and unofficial payments are necessary to secure such credit (see section 6.4). Secondly, many firms unable to obtain fixed capital credit (kredit investasi) are able to secure a 'credit ceiling' (kredit plafon) - a type of overdraft facility - which has a higher interest rate. Nevertheless, for firms fortunate enough to secure credit at the bottom of the official range of interest rates, they are the cheapest source of loan finance in Indonesia.

Bank Indonesia subsidises the operations of the state banks by refinancing their loans (for details of the complex relationship that exists, see Arndt, 1979). Massive and continuing subsidies have been necessary for two reasons. First, some lending rates are not significantly greater than the average deposit rate and, for several types of credit, are actually below some deposit rates. Secondly, the banks have yet to achieve high standards of efficiency. Their administrative costs are very great, and several have accumulated very large bad debts and arrears. Thus, not only have borrowers obtained credit at low interest rates, but there is an additional subsidy implicit in the huge arrears.

6.3.2.1 Small Credit Programs

Another contentious issue on which little information is publicly available is which business group is the principal

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6 Information on the magnitude of these problems is not publicly available, but one indication is the evidence that came to light following the near collapse of the largest state commercial bank, Bank Bumi Daya, in early 1977. It was reported that as much as one-third of its loans outstanding were either overdue or uncollectable, and that perhaps 30 percent of these loans could be classified as bad (Jenkins, 1978:40).
recipient of loan funds. Since 1973 in particular, there has been mounting criticism that small pribumi firms have not been participating in the credit programs, and that most of the loans have been going to larger non-pribumi firms. The government responded by initiating small credit programs for fixed capital (KIK or Kredit Investasi Kecil) and working capital (KMKP or Kredit Modal Kerja Permanen) in November 1973. These are cheap credit programs (interest rates are given in footnote 5) exclusively for pribumi firms. The maximum loan for each program is Rp10 million and the 25 percent self-finance requirement may be waived by the bank. In addition, two financial institutions have been established to assist small firms. These are P.T. Askrindo, which furnishes loan insurance for small borrowers, and P.T. Bahana, which provides equity capital in exchange for the right to participate in the management of small firms.

Undoubtedly, the effect of these programs has been to increase the volume of small-scale lending by the state banks. Nevertheless, they should be seen in proper perspective. Small loans have always been available, that is, prior to the introduction of the programs there was not a specified minimum loan value. Non-pribumi businessmen, though excluded from the programs, can still borrow small amounts under the Kredit Investasi scheme. Banks have been reluctant to waive the self-finance requirement unless substantial (and liquid) collateral is put up, which is not easy for small firms. Askrindo and Bahana have had little impact. Finally, credit extended under

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7 In 1972, for example, three percent of borrowers received over half the funds loaned (Grenville, 1976:83). In 1974 75 percent of loan funds disbursed consisted of loans of over Rp 100 million (Donges et al., 1975:102), that is, to medium and large borrowers.

8 Bahana can invest only in limited liability companies, thereby excluding most medium and small firms. In fact, most of its funds are invested in time deposits with state banks. By March 1976, almost five years after its establishment, Askrindo had settled fewer than 300 claims and payments amounted to just Rp 55 million (about $130,000).
these schemes is a very small proportion of total state bank lending. Aggregate information on an industry-wide basis is not publicly available, but one indication is total credit extended to the Yogyakarta textile industry by the state banks from 1974 to 1976 (Table 6.4). Although textiles in Yogyakarta are predominantly small scale (it is a major batik centre), the

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of Firms Receiving Credit</th>
<th>Total Credit Extended (Rp million)</th>
<th>Percentage of Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIK</td>
<td>4</td>
<td>4.5</td>
<td>0.2</td>
</tr>
<tr>
<td>KMKP</td>
<td>40</td>
<td>59.5</td>
<td>2.2</td>
</tr>
<tr>
<td>All other(^a)</td>
<td>156</td>
<td>2,680.5</td>
<td>97.6</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>2,744.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Bank Indonesia, Yogyakarta office

Note: \(^a\) Includes all state commercial banks, Bapindo and the regional development bank

two small credit programs accounted for a tiny proportion (2.4 percent) of total credit extended. We shall return to the small-scale credit programs in the next section.

6.3.3 Private Banks

Private banks range from quite large, well established multi-branch operations to family-run banks in size and method of operation more akin to money-lenders in the unorganised credit market. In 1977 there were 85 such banks with 261 offices, in contrast to the 675 offices of the 5 state commercial banks. Since 1973 no new private banks have been permitted to be established, and Bank Indonesia has been encouraging mergers in order that they may play a more effective role as financial intermediaries. Bank Indonesia also offers various forms of financial assistance to those
private banks considered financially sound, and since 1977 several have become distributors of small-scale credit, with access to Bank Indonesia refinance facilities. However, their role has never been well defined and, because they are almost exclusively Chinese-owned, a lingering suspicion exists towards them.

6.3.4 The Unorganised Credit Market

The unorganised credit market usually refers to all other credit activity outside the formal banking sector (ie. the first three credit sources). As its name implies, it is a heterogeneous sector including, at one end of the spectrum, trader's credit to well established small and medium firms at 3 percent monthly and, at the other extreme, small short term consumption loans in the kampung of 2 percent or more per day. In contrast to the organised sector where interest rates are specified clearly in the loan agreement, it is often difficult to determine the rates prevailing in the unorganised sector. Credit may be extended in the context of a commercial transaction in which case it is not easy to separate interest and entrepreneurial profit (see section 6.5 below, and Ace, 1974).

Interest rates in the unorganised sector are generally significantly above those in the organised sector. There is much debate regarding the causes of the differential: to what extent it reflects the higher real cost of lending, and to what extent market imperfections contribute. Lack of information has given free rein to strong opinions, but there are few detailed investigations of the unorganised credit market in LDCs. The size and interest rate structure of the unorganised

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9 One study has suggested that on average 'monopoly profits' explain about one-sixth of the differential in LDCs, but it is not explained how this figure is determined (Wai, 1977:312).
sector are to a considerable extent determined by government policy towards the organised sector. If real returns to savers and real lending rates are low in the organised sector, loanable funds will be scarce (assuming no central bank refinancing). As a result, most small firms will be excluded from the organised sector and be forced into the high interest unorganised sector. The response of many governments has been to place restrictions on the operation of moneylenders, but clearly the most positive step is to expand the size of the organised sector (policy reforms are discussed in section 6.6 and Chapter Eleven).

6.3.5 Financial Dualism?

The discussion above has emphasised the marked difference between the unorganised and organised credit markets. Some writers maintain that the difference is such that LDCs are characterised by 'financial dualism', in that a distinct cleavage exists between these two credit sectors and conditions of credit in each sector are largely independent of the other. Indonesia's capital market is fragmented and the distinction between the organised and unorganised sectors is important. However, financial dualism is an inappropriate label for two reasons.

First, the range of interest rates does not exhibit the sharp cleavage that is implicit in the dualistic model. The upper level of interest rates charged by the state banks and those of the private domestic banks bridge the gap between the unorganised sector and the lowest rates in the organised sector (see Table 6.2). Secondly, there is a substantial interdependence between the two sectors and the four main

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10 In the case of Indonesia, moneylending is in fact illegal. An Act of Parliament requires that all lenders must be licensed and, because only the banks possess a licence, all other lending is by definition 'unlicensed' and therefore illegal. Despite press reports of periodical drives against moneylenders (rentiers) however, little is (and could be) done to enforce the Act.
sources of finance, despite the fragmentation. Foreign banks have established close ties with the private banks, especially in loan projects outside Jakarta, and more recently with the state banks in setting up several non-bank financial intermediaries. The policies adopted in the state banking sector affect the other financial sources in several ways. State bank deposit rates presumably influence interest rates in the unorganised sector, through their effect on the opportunity cost of loan funds. There is considerable (illegal but very profitable) relending of state bank loans to the unorganised money market. Finally, it was noted above that Bank Indonesia exerts much influence over the private banks through a system of financial incentives.

6.3.6 Credit Sources: Survey Findings

Table 6.5 presents our survey findings regarding credit sources for each group of firms for the period 1974-1977. Part (a) refers to all borrowings by firms (i.e. from all sources). As would be expected, all large and most medium firms have borrowed from the two 'low interest' sources, state banks and foreign sources. Of the firms with fully-automatic looms, all but one had borrowed from foreign banks or overseas machinery suppliers. For medium power loom firms the range of credit sources was wider. Five of the 23 obtained overseas finance (four of which were from machinery suppliers), but over half had also borrowed on the unorganised market. Amongst the smaller firms, a surprising number of hand loom firms (14 out of 39) had borrowed from state banks. However this figure is not typical of the hand loom sector as a whole. Prosperous hand loom firms were deliberately 'over-represented' in our survey in order to discover the reasons for their success (these firms were discussed in Appendix 4.3).

A clearer picture of borrowing patterns is given in Table 6.5(b), which indicates the 'primary' credit source (defined in terms of volume of looms) for domestic private firms.¹¹

¹¹ The three foreign firms are excluded because they must borrow overseas; the four state firms because their borrowings are either arranged or guaranteed by the government.
Table 6.5: Credit Sources in Survey of Firms, 1977

(a) Credit Sources According to Firm Group, All Firms, 1974-1977a

<table>
<thead>
<tr>
<th>Firm Group (type of loom)</th>
<th>Number of Firms</th>
<th>Credit Sources</th>
<th>Number of Borrowings (all sources)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Foreign Sources</td>
<td>State Banks</td>
</tr>
<tr>
<td>Fully-automatic Looms (M3)</td>
<td>10</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Semi-automatic Looms (M2)</td>
<td>23</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Non-automatic Looms (M1)</td>
<td>9</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Hand Looms</td>
<td>39</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>14</td>
<td>40</td>
</tr>
</tbody>
</table>

(b) Primary Credit Source, Domestic Private Firms, 1974-1977

<table>
<thead>
<tr>
<th>Firm Group</th>
<th>Number of Firms</th>
<th>Credit Source</th>
<th>Foreign Sources</th>
<th>State Banks</th>
<th>Private Banks</th>
<th>Money-lenders and Textile Tradersb</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3c</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>M2d</td>
<td>21</td>
<td>3</td>
<td>9</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>9</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Hand Looms</td>
<td>39</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>5</td>
<td>17</td>
<td>6</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Research

Notes:  
a Includes all borrowings by all firms, hence 'Number of Borrowings' exceeds 'Number of firms'
b Excludes yarn sales on credit from spinning mills
c Excludes three foreign and two state enterprises
d Excludes two state enterprises
At either end of the spectrum, large firms borrow primarily from the two cheap credit sources, whilst the great majority of handloom firms (35 out of 39) depend mainly on moneylenders and traders for finance. Indeed, the three handloom firms for which state banks are the primary source of credit are most atypical: one of the firms was discussed in Appendix 4.3 (Firm A); the other two are amongst the five largest handloom firms in Indonesia, each employing a workforce of about 200 people. Moreover, most of the 14 handloom firms borrowing from state banks secured very small loans – only four had borrowed Rp 2 million (just under $5,000) or more over this period. Medium and small powerloom firms are between these two extremes, indicating that even for established enterprises, access to the organised credit market is not assured. A little over half the medium powerloom firms relied primarily on cheap credit sources, but for almost one-quarter the main source was the unorganised money market. The latter was also the main source for over half the small powerloom firms.

6.4 The Lending Operations of State Commercial Banks

How relevant are the arguments discussed in section 6.2 to the behaviour of the state commercial banks in Indonesia? Real interest rates are very low, which has encouraged an inefficient allocation of resources, particularly in the adoption of inappropriate industrial technology. Indonesia differs from many other LDCs however, in that the banks are able to offer low lending rates not only because real deposit rates are low or even negative, but also because they receive massive subsidies from Bank Indonesia. For this reason the imbalance between the supply and demand for loanable funds in the formal credit sector is not as great as in many other countries. Nevertheless, it will be argued that, apart from the deleterious effects on allocative efficiency, setting the lending rate very low has led to the widespread existence of bribes and reliance on political connections to obtain loans, and has also resulted in banks concentrating more on the ability of lenders to repay than on the bankability of the project. Moreover, the rigid
interest rate structure imposed on the banks gives them little incentive to lend to smaller borrowers.

6.4.1 Pungli

Pungli (= pungutan liar) is the acronym given to a wide range of unofficial payments in Indonesia. In borrowing from state banks, their existence is widespread - and acknowledged publicly by high authorities. In practice they take a variety of forms. It might be suggested discreetly to the loan applicant that procedures would be expedited greatly by a gift to the manager or his staff or, more frequently, the amount received by the applicant is less than that specified in the contract (e.g. a borrower obtaining a nominal loan of, say, Rp 10 million receives only Rp 9 million).

The effect of pungli is, of course, to raise the effective rate of interest on loans from state banks. Several factors determine the size of the cut, but in general there is an inverse relationship between the percentage cut and the amount of the loan. That is, there are substantial pecuniary economies of scale in securing state bank loans. For example, cuts for small borrowers are as high as 10 percent off the nominal loan (one case found on fieldwork was even 15 percent), whereas for larger borrowers the percentage cut is usually lower, substantially so for regular borrowers. There are several explanations for the differential between large and small borrowers. First, the unit administrative cost of small loans is greater than that of larger borrowings, yet the rigid interest rate structure imposed on banks does not allow them to

12 For example, when opening the head office building of the Jakarta Regional Development Bank, the then Governor of Jakarta, Ali Sadikin, stated that 'he had been told' a pay-off of six percent was needed to obtain credit from state banks (Indonesia Times, February 21, 1977).

13 A typical example is the case of a small mechanised weaver in a city of Central Java, to whom it was suggested that a gift of a colour television set would facilitate a loan of Rp 6 million (about $15,000).
recoup these additional expenses officially. Relatively higher illegal payments from small borrowers may be regarded as a form of 'compensation' to the banks, or as an incentive to lend to small firms. Secondly, unlike larger firms, the owners of most small firms do not have access to alternative sources of cheap credit, and therefore they are less likely to resist additional unofficial exactions. Finally, small businessmen generally do not possess political leverage or business connections to the same degree as larger ones, and hence have less influence over the banks.14

Many other factors influence the magnitude of pungli in bank loans. As mentioned above, the personal relationship between the applicant and bank officials (local and central) is an important factor. Regional variations in the behaviour of banks are also found.15 Further, the cut depends on the approach of the loan applicant, in the case of larger borrowers. If, for example, the borrower asks for a loan of a certain amount and requests the bank to arrange all formalities in connection with the application the cut would be much greater than if each procedure is followed carefully, and all the bureaucratic requirements of the bank adhered to meticulously. Finally, the government's periodic corruption drives, whilst usually having little lasting impact, are at least a temporary interruption to the corruption process, by making bank officials more reluctant to demand extra payments.

14 The following statement of a medium (non-pribumi) mechanised weaver is typical of the experience of many businessmen. It exemplifies the importance of koneksi (good connections) in obtaining state bank credit and other government favours:

'A close associate of mine with very high political connections introduced me to a Director of one of the State Banks in Jakarta. He gave me a letter to the local bank manager who immediately offered me Rp 50 million. "What about the feasibility study?" I asked. "It is not necessary", he replied, "we'll arrange it later". They never did'.

15 For example, none of the Balinese hand loom firms in our sample complained of significant additional payments to secure credit. The KIK and KMKP programs in Yogyakarta are relatively well run.
6.4.2 Appraisal Procedures

State banks are discouraged from small-scale lending not only because of higher unit administrative costs but also because most are ill-equipped to appraise loan applications. In our experience accompanying bank officials on visits to firms, appraisal procedures appeared to be extremely superficial, being restricted to several basic questions regarding monthly production, profit levels and selling price. Moreover, although some sectoral specialisation exists between the five state commercial banks, most loan officers have only a very general knowledge of conditions prevailing in a particular manufacturing industry, let alone one segment of that industry (eg. small-scale weaving). For example, during the whole of the orde baru, to our knowledge only one detailed report has been prepared by the state banks on the weaving industry (Bank Indonesia dan Bank Negara Indonesia 1946 [hereafter referred to as Bank Report], 1971). Owing to their very localised perspective, the ability of the banks to assess a firm's prospects accurately is weakened.

Appraisal of loan applications from small firms is more difficult than that for large firms in several respects. Some of these difficulties are mentioned in the report compiled by the banks (Bank Report, 1971) - adequate books are rarely kept, small businessmen usually are not attuned to the thinking and business procedures of 'modern banking', and a sudden inflow of money in the form of a loan may be channelled into non-productive uses. Compounding this problem is the scarcity of small loan officers in the state banks and the fact that most have had inadequate training. One international organisation

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16 This often leads to quite fundamental errors. A typical example is the case of one hand loom weaver given credit to buy two mechanised preparation units, only to find later that their electricity requirements exceeded his installed wattage. (Increasing wattage to a house or factory is very expensive in Indonesia.) Twelve months after the purchase, the machinery was rusting in a shed corner and loan repayments had yet to commence.
which examined the state banks' performance noted that one loan officer should be responsible for only 30 to 40 loans requiring follow-up and 30 to 40 applications per year. In the case of Indonesia however, it observed:

Many of the state banks' provincial branches are understaffed, with small loan credit examiners at times having to supervise portfolios of more than 250 loans. Some of the banks do not yet have specialised small loan officers, despite a high level of small loan activity.

It is not surprising, therefore, that state banks place such great emphasis on collateral and the current ability of the borrower to repay, and less on the bankability of the project. Obtaining information on a project is an additional cost to the banks, which they have little incentive to incur. High (and liquid) collateral is a cheaper and simpler alternative, but this greatly disadvantages small firms.

6.4.3 Other Problems in Lending to Small Firms

In recent years the state banks have attempted to adopt a more flexible and innovative approach to small-scale credit, but for several reasons their operations are not well suited to the credit needs of small firms. One difficulty is the bureaucratic requirements that must be fulfilled before an application for credit can even be considered. All firms in Indonesia must be licensed with the relevant government department and local authorities, and licences must be renewed annually. In practice, many small and household enterprises do not bother with this requirement, unless the office concerned makes a concerted effort to check. In applications for credit however, banks require that all licences are current.\footnote{There have been reports also of banks demanding a certificate of non-involvement in the 1965 coup attempt. This was not found to be the case in our survey. Owners of two firms in our sample who were former golongan C detainees (suspected of involvement in the coup attempt but with insufficient evidence to bring them to court) had obtained credit, but each with substantial unofficial payments.} This represents a considerable burden for these small units. A
household hand loom unit we visited exemplified the problem. The owner had recently applied for a KMKP loan of Rp 1 million ($2,500) and, because his licences were incomplete, a further Rp 38,000 (3.8 percent of the sum requested) had to be outlayed to get them in order. A further two months had elapsed since, and no reply had been received from the bank. Thus, the obstacles these enterprises face in securing state bank credit are:

(i) the time and cost of getting their licences in order;
(ii) the often lengthy period before the bank decides whether to grant the request;
(iii) the quite strong possibility that the application will eventually be rejected; and
(iv) the likelihood that, even if the bank agrees, the loan granted will be less than that requested, and the virtual certainty that a cut will be taken from the loan by the bank.

Moreover, in addition to the banks' strict collateral requirements - Askrindo is of little assistance - items put forward as collateral must be insured, which few small firms would do in the normal course of events. For all these reasons, many small businessmen consider it just as cheap and far quicker to borrow from their traditional source, the moneylender, despite the large nominal difference in interest rates.

A more general problem is the cultural gap between bank officials and small borrowers, which acts as a deterrent to potential applicants. Ace's (1974:56-57) comments on difficulties faced by farmers are also applicable to small businessmen:

Bank employees are part of the government bureaucracy and more or less urban-oriented as expressed in their behaviour, manner of dress and attitudes. Farmers, tenants, farm labourers and fisherman behave differently, dress differently and have different attitudes.
We can imagine the first reaction of bank employees if a barefoot and poorly-dressed farmer enters a bank to apply for credit.

6.4.4 The Problems from the Banks' Perspective

The banks' relatively poor economic performance and their failure to lend extensively to small-scale industry should be seen in proper perspective, because there are substantial constraints on their operations. First, state banks are near the centre of the extremely sensitive pribumi/non-pribumi issue. Owing to frequent protests from the pribumi business community, banks are often pressured into lending to pribumi firms to which under normal circumstances they might not wish to lend (at least on the same conditions). Undoubtedly, their inability to apply strict commercial criteria to all loan applications has contributed to the huge arrears problem.

A second and related problem is that of 'command loans'. For these, the banks have little control over the borrower, and are unable to evaluate the project for which the funds are to be used. As one journalist in Jakarta noted recently:

In some cases, powerful figures in the government simply instructed bank directors to approve loans to certain nominated persons or enterprises. All too often bank managers received little or no collateral in granting these 'command loans' and could virtually kiss their money goodbye (Jenkins, 1978:42).

Command lending is symptomatic of a more general problem relating to cheap credit programs. It has been observed in other LDCs that arrears frequently are more serious the more generous the credit program, because recipients tend to treat the loan as a form of transfer payment (Gonzalez-Vega, 1977). In Indonesia, also, such a view has wide currency. State bank loans are regarded, if not as 'gifts', then as commitments which can be deferred if the economic climate is not
propitious.\textsuperscript{18} This feeling, combined with the widespread political patronage used to obtain credit, creates formidable difficulties for the state banks in attempting to recover their loans.

The vexed issue of collateral is a third reason for the banks' arrears problem and their reluctance to lend to small firms. Most small firms have few portable assets which can be offered as collateral, as most of their fixed capital is in the form of buildings and land. Bank officials are reluctant to accept land as collateral however, because of the extremely complicated patterns of ownership, especially in rural areas. As a major study in the field of credit and security in Indonesia concluded:

Especially in the field of land rights, the adat [traditional] concept of ownership is much influenced by the community, because the soil and the communal group are closely bound together. Individual property rights are merged in the collective community's right of disposal (Gautama et al., 1973:18).

Moreover, the process by which the bank acquires a defaulter's collateral is cumbersome and protracted. Responsibility is in the hands of the Body for the Settlement of State Debts (Badan Urusan Piutang Negara, or BUPN). Banks have no control over the prosecution of the defaulter, and many loans in arrears are never recovered.

A final problem is the teaching of Islam regarding the payment of interest. This issue, not of great overall importance, is of relevance mainly to small firms (pribumi and Arab-owned) because most of the large firms are Chinese, foreign or government-owned. Several businessmen interviewed stated they would not borrow from banks for religious reasons

\textsuperscript{18} Or even if it is propitious. Stories abound of artificial bankruptcies in which an enterprise may be 'bankrupt', but the owner has transferred his borrowed funds elsewhere.
(although purchases on credit are allowable). In our sample, they were located mostly in the santri (strict Moslem) region of Pekalongan and, although relatively few in number, they were usually influential in the Moslem community. To the extent that Islamic usury laws are adhered to, this represents an additional limitation on state bank lending to small firms.

In summary then, the state banks are under considerable pressure to lend to the small prihumi business sector, but few financial incentives exist to reorientate their lending activities. Officials associated with the small credit programs in Indonesia assert that the default rate amongst small firms is actually lower than that for large firms, which has also been the experience of credit programs in other LDCs (Gonzalez-Vega, 1977). Even if this is correct however, it must be remembered that the larger loans include a substantial proportion of 'command loans'. These should be excluded because the banks have little control over the funds; in some cases they may not even know how the funds are used. For the remaining 'non-command' loans, it would be most surprising if delinquency in arrears is more serious in the case of large borrowers, although understandably such information is virtually impossible to obtain. In any case, the banks prefer large loans because administrative costs are lower, collateral problems are less, and these borrowers generally have better personal connections with bank officials.

6.5 Aspects of the Unorganised Credit Market

Table 6.5 showed that the great majority of hand loom firms and many of the small and medium power loom firms rely primarily on the unorganised credit market for finance. This section discusses the terms on which this credit is obtained.

6.5.1 Traders' Credit

By far the most important source of credit in the unorganised money market for weaving firms is that extended by textile traders to firms purchasing yarn and other raw materials. Small weaving firms in particular rarely pay cash for their
inputs. The minimum monthly interest rate in 1977 was in the range 3.0 to 3.5 percent. This applied to substantial firms (e.g. a hand loom firm operating throughout the year) whose owner regularly purchased yarn from the trader. In the case of smaller purchases and the owner not having an established commercial relationship with the trader, monthly rates were as high as 5.5 percent.

Can these rates be described as 'exorbitant'? They are several times greater than state bank lending rates and, from the trader's point of view, lending costs are minimal. The credit is granted in the context of selling yarn, and thus administrative costs are very small, especially as sales are mostly to regular customers and in effect the loan is being 'rolled over' each period. Similarly, the default risk is low if the two parties know each other. Also informal information networks regarding the financial reputation of weavers exist amongst the traders. Nevertheless, these rates are well below those reported for short term consumption loans, and the lower part of the range is not much higher than that charged by private banks (of between 2 and 3 percent). For established small and medium firms buying yarn regularly, 3 percent is probably a close approximation of the competitive market price. There is no evidence of serious market imperfections. Many traders operate at the large textile markets where these firms buy their yarn and sell their cloth. Consequently price information is obtained easily and the scope for collusion amongst traders limited.

6.5.2 The Cashing of Post-dated Cheques

Until 1971 the issuing of post-dated cheques (cek mundur) was regarded as a serious economic crime and carried a maximum penalty of death. The law was never invoked and ultimately was repealed as unworkable, but the government still frowns on the practice (Gautama et al., 1973:101-102). In the textile industry cek mundur are used extensively by traders purchasing cloth from small firms. The period by which a cheque is post-dated varies according to the state of the textile market.
When demand is strong it may be one month or less, but for the four to six months when the market is slack it may be post-dated by up to three months. Owners wishing to cash these cheques before they are due can surrender them to a local moneylender, the usual monthly discount rate being 5 or 6 percent. Owing to frequent cash-flow problems when the market is slack, many firms resort to this method of finance, which reduces their profitability considerably.

The reasons for these relatively high interest rates are not entirely clear. Presumably default risk is not a major factor. The risk is not that the weaver will default but rather that the textile trader (purchaser) who has issued the cheque will not honour it. In most weaving centres the moneylender would be acquainted with the trader's credit reputation. The most likely explanation is the urgency with which the weaver requires cash, the absence of the usual credit source (yarn traders are reluctant to extend credit beyond one or two months, especially during the slack period), and the scope this creates for informal collusion amongst moneylenders.

6.5.3 Maakloon as a Form of Credit

In Chapter Four (sections 4.8 and 4.9) the system of maakloon or putting-out was discussed. This is also a form of credit, because the firm receiving the order does not have to provide any working capital apart from wages advanced, which are minimal. Several firms included in our sample were weaving a proportion of their cloth under maakloon and selling the remainder independently, or had just switched from independent weaving to maakloon. By comparing the return to the weaver under each system the discount rate implicit in the case of maakloon can be calculated. However, this cannot be equated with the rate of interest on working capital. In addition to the cost of working capital the rate includes an element of risk avoidance - on the part of the weaver - through having an assured market, and a saving of direct (but small) marketing costs.
Two examples of maakloon are given (for detailed calculations see Appendix 6.1). Example 1 is a village enterprise producing mosquito netting (kain klambu) on three hand looms. Net profit (exclusive of the cost of working capital) per metre is Rp 40 if weaving independently; if producing for a trader under maakloon the owner receives Rp 60 per metre, of which production costs are Rp 55. The 'maakloon loss' is Rp 17 or Rp 8 per metre, depending on what interest rate is used in calculating the cost of working capital (the two most likely for household weavers are 4 and 6 percent). Alternatively, the discount rate under maakloon is 7.8 percent (see Appendix 6.1). Example 2 is a small urban power loom firm producing blankets. About half its output is sold under maakloon at a 'market equivalent' price of Rp 10,682 per kodi (20 pieces), the other half being marketed independently for about Rp 12,000 per kodi. This firm differs from the first in that the maakloon arrangement has been in operation for over 18 months, the price being adjusted in line with market conditions. The weaver normally would obtain credit at 3 to 4 percent monthly, thus the 'maakloon loss' is between Rp 358 and Rp 598 per kodi.20

Thus the discount rate implicit in the maakloon calculations is always greater than the usual interest rates paid by firms, considerably so in the case of the lower of the alternative rates. There are two explanations for this. First, the difference between the two rates is a measure of the extent to which the weaver is prepared to forego a return in order to have an assured market, if only for a short period. Hence the

---

19 'Maakloon loss' is defined here as the difference between net profit (deducting the cost of working capital) if the cloth is sold independently, and the return the weaver receives if working on a sub-contracting basis.

20 An interest rate of 1.5 percent is also included, to indicate the effect on profitability of obtaining state bank credit. Some very small power loom firms do borrow from state banks; this weaver had borrowed a small amount in 1970 but subsequent applications had not been successful.
Maakloons discount rate includes an element of risk avoidance, and cannot be described only as the cost of working capital. The second is that the maakloon market is imperfect. This is an unsubstantiated hypothesis, although quite likely in the first example because there are just three maakloon buyers in the nearest town, all of which offer the same price.

It should be noted that there are some similarities between the practice of maakloon and the system of ijon credit. Ijon occurs in several forms, the most common being the purchase (by a middleman) of a crop whilst still green, at a price considerably below that which could be expected upon harvest (Ace, 1974:63-65). A major reason for these types of arrangements is a shortage of working capital. For the farmer it is the lag between planting and harvest, for the weaver the lag between production and payment for cloth. Moreover, both ijon and maakloon free the owner from having to market his product.

There are however, several differences between the two. The first is that liquidity and marketing problems are not the only reasons why farmers adopt ijon. An additional factor is that it enables them to avoid traditional social obligations regarding the division of the harvest between the harvester and the owner (Collier et al., 1973:39-41). This is not a consideration in the case of weavers adopting maakloon. The second relates to the fact that the risks and responsibilities of the ijon buyer are usually much greater than those of the trader putting out to a weaver, and consequently the implicit discount is far higher. The ijon buyer must organise the harvest, transportation and storage of the crop, and bear the risk that the price or yield is lower than anticipated. By contrast, the textile trader has few additional costs. There is also little risk that the cloth will not be supplied, although some problems arise in ensuring that quality is maintained. For example, weavers sometimes produce cloth of
lower density (and keep the yarn thus saved) or substitute inferior dye-stuffs for those provided.\textsuperscript{21}

6.6 Conclusion

In several respects the Indonesian government's policies towards the capital market differ from the stereotype of LDCs as portrayed in section 6.2 above. During the earlier years of the orde baru in particular, important steps were taken in the direction of greater financial liberalisation, although recent trends have not been so encouraging.\textsuperscript{22} Indonesia's economy is relatively open, and no foreign exchange controls or restrictions on capital movements exist. Foreign and private domestic banks are permitted to operate (though with considerable controls). Loanable funds in the formal sector are not so scarce because some deposit rates set by the state commercial banks are quite high and also because Bank Indonesia offers refinance facilities to the banks. In practice, there are few controls over the operation of the unorganised money market.

Nevertheless, from the point of view of the selection of industrial technology, there are serious distortions in the Indonesian capital market. The lending rates of the state banks, which dominate the organised credit market, are too low. Capital is priced well below its scarcity value, which has encouraged private investors to adopt inappropriate technology in the manufacturing sector and elsewhere. On the other hand, smaller firms have only very limited access to the organised credit market, and the state banks have little incentive to

\textsuperscript{21} No traders or firms interviewed that were organising maakloon had ever experienced outright theft of the yarn. Experienced textile buyers usually can identify cloth of lower density, although inferior dye-stuffs are more difficult to discern and may be apparent only after the cloth is washed.

\textsuperscript{22} It is significant that two of the major works on credit and finance in LDCs, both of which have relatively favourable comments on Indonesia's financial policies after 1966 (McKinnon, 1973:111-113 and Shaw, 1973:113, 216), were written before 1973.
lend to them. Consequently, the range of interest rates facing firms in the weaving industry is very wide - from less than 10 percent per annum up to six percent monthly. Whilst differences in interest rates are to be expected, government policies have exacerbated the fragmentation of the capital market.

<table>
<thead>
<tr>
<th>Production price/m</th>
<th>Production costs (excluding working capital costs)/m</th>
<th>Profit/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rp 150</td>
<td>Rp 250</td>
<td>Rp 40</td>
</tr>
</tbody>
</table>

To obtain net profit/metre, the cost of working capital must be deducted. Working capital is, on average 1.5 times the value of monthly production.

Production/month = 3.6 months x 60/day x 10 days/month = 216m

Working capital = Rp 400 x 1.5 months x Rp 300/m

= Rp 216,000

The cost of working capital depends on the interest rate (i) paid. The two most likely rates are 4% and 6% per month.

\[
\begin{align*}
\text{Interest cost/m} & = \frac{216,000 \times 0.04 \times 1}{12} \\
& = \frac{216,000 \times 0.06 \times 1}{12} \\
& = \frac{216,000 \times 0.08 \times 1}{12} \\
& = 8,640 \\
& = 12,960 \\
& = 17,280
\end{align*}
\]

Alternatively, if one assumes that the difference between the profit when working independently (Rp 40/m) and the net profit under ماكليش (Rp 5/m) represents the interest cost only, i.e. the saving of not having to provide working capital, then the implied rate of interest, i,

\[
\frac{\text{'cost' of ماكليش/m}}{\text{value of working capital/m}} \times 100
\]

= \frac{5}{216,000} \times 100

= 7.38/\text{month}
APPENDIX 6.1

MAAKLOON CALCULATIONS

Example 1

Selling price/metre = Rp300
Production costs (excluding working capital costs)/m = 260
Profit/metre = 40

To obtain net profit/metre the cost of working capital must be deducted. Working capital is on average 1.5 times the value of monthly production.

Production/month = 3 looms x 8m/day x 20 days/month = 480m

∴ Working capital = 480m x 1.5 months x Rp 300/m

= Rp 216,000

The cost of working capital depends on the interest rate (i) paid. The two most likely rates are 4% and 6% per month.

<table>
<thead>
<tr>
<th>i/month</th>
<th>interest cost/(= \frac{i \times Rp \text{216,000}}{480})</th>
<th>interest cost/metre</th>
<th>'maakloon loss'/metre (= 40 - 5 - (3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.04</td>
<td>8,640</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>0.06</td>
<td>12,960</td>
<td>27</td>
<td>8</td>
</tr>
</tbody>
</table>

Alternatively, if one assumes that the difference between the profit when operating independently (Rp 40/m) and the net profit under maakloon (Rp 5/m) represents the interest cost only, i.e., the saving of not having to provide working capital, then the implied rate of interest, i,

\[
\text{interest cost/metre} = \frac{\text{'cost' of maakloon/metre}}{\text{value of working capital/metre}} \times 100
\]

\[
= \frac{35}{480} \times 100
\]

\[= 7.8\%/\text{month}\]
Example 2

A similar procedure is adopted in Example 2, except that the 'price' under maakloon is compared with that if operating independently.

Working capital is assumed equivalent to the value of two months production; average monthly production is 80 kodi per month

\[ \text{working capital} = 80 \text{ kodi} \times \text{Rp } 12,000/\text{kodi} \times 2 \text{ months} = \text{Rp } 1,920,000 \]

The cost of working capital and 'maakloon loss' are calculated as before, with the difference that three monthly interest rates are now specified, 1.5%, 3% and 4%.

<table>
<thead>
<tr>
<th>i/month interest cost (= i x Rp 1,920,000)</th>
<th>interest cost/ kodi (2)</th>
<th>'maakloon loss' (= 12,000 - 10,682) (3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.015</td>
<td>28,800</td>
<td>360</td>
<td>958</td>
</tr>
<tr>
<td>.03</td>
<td>57,600</td>
<td>720</td>
<td>598</td>
</tr>
<tr>
<td>.04</td>
<td>76,800</td>
<td>960</td>
<td>358</td>
</tr>
</tbody>
</table>

Alternatively, if the 'maakloon loss' is treated as the cost of capital, the implied interest rate, i,

\[ \text{cost of maakloon}/\text{kodi}\div\text{value of working capital}/\text{kodi} \times 100 = \frac{1,318}{1,920,000} \times 100 = 5.5\%/\text{month} \]
CHAPTER SEVEN
WAGES AND CONDITIONS OF EMPLOYMENT

7.1 Introduction

An examination of wages and conditions of employment in the weaving industry is important for two reasons. First, a central theme in our study is the necessity to analyse the choice of technique at a disaggregated level. In order to understand why techniques are selected, it is essential to come to grips with the fragmented nature of product and factor markets in LDCs. The previous chapter concluded that interest rates differ markedly between large and small firms, much more than can be explained by economic factors alone. Substantial wage differentials also exist. The first section (section 7.2) discusses the magnitude of and reasons for these differentials (to be called inter-technique wage differentials, or ITWDS).

Secondly, it is necessary to examine in greater detail conditions of employment in the hand loom sector. Our study arose out of a concern that one of the effects of the Indonesian government's policies since 1966 has been the adoption of techniques more capital-intensive than that warranted by Indonesia's factor endowments, and that this has retarded the growth of the workforce in manufacturing. However, as we argued in Chapter Two (section 2.2), there is little purpose

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1 I am particularly grateful to Chris Manning for his assistance with this chapter. During our survey of weaving firms, wage data for the main occupation categories were collected. However, the three-industry study by Manning (1979), which included weaving, contains a wealth of data on wages and employment. He has been most generous both in his permission to use his data, and in several discussions on aspects of the labour market in the industry. This has enabled a more thorough examination of the labour market in section 7.2 than would otherwise have been possible.
in creating jobs if earnings are insufficient to cover basic human needs. Hence a knowledge of wages and employment conditions in small-scale industry is important in any discussion of the desirability of promoting labour-intensive technology. Thus section 7.3 analyses wage levels in the handloom sector in greater detail.

7.2 Inter-Technique Wage Differentials in the Indonesian Weaving Industry

Past discussions of labour markets and wage differentials in LDCs have placed much emphasis on rural-urban wage differentials. Many writers have highlighted the existence of high wages in the modern urban economy in the context of studies of rural-urban migration (eg. Harris and Todaro, 1970). Frequently these high wages are attributed to institutional factors: strong urban-based trade unions; inappropriate government wage and labour regulations which are unenforceable outside the modern sector; firms earning monopoly profits—often the result of various forms of government patronage—sharing these benefits with the 'labour aristocracy' which they employ; and foreign firms, sensitive to accusations of 'exploiting' the local labour force, paying above average wages. With the exception of the latter however, these factors are not of great importance in the Indonesian labour market. As Manning (1979:370) concludes:

Although some of these institutional factors [trade unions and government regulations] contributed to wider wage differentials, ... they were not sufficiently strong to account for the large differentials that we have described in earlier chapters.

(See also Chapter Five section 5.4, above.) Clearly, in the case of Indonesia, institutional factors are not the major determinant of ITWDS. Alternative explanations must be sought.

In the growing literature on the choice of industrial technology in LDCs, surprisingly little attention has been paid to the actual state of the labour market and conditions of
employment. We believe that these deserve far more attention, especially as increased emphasis is being given to the importance of micro studies. Some of these studies will be reviewed in the next chapter (Chapter Eight, section 8.2). Most choice of technique analyses seek to calculate 'boundary prices' for wage and interest rates beyond which it would be economically rational for private investors to switch from one technique to another. However, many studies make the quite unrealistic assumption that wage levels are invariant to the technique of production in use.

Thus, in their treatment of wages and labour markets in LDCs some of the existing studies are deficient in two respects. First, many simply ignore ITWDs altogether. To the extent that wage variations are considered (for example, in the context of calculating boundary prices), it is assumed that they apply to all techniques. Secondly, when discussion of ITWDs is introduced, it is often argued that institutional pressures are the main factor contributing to the difference.

7.2.1 The Magnitude of Inter-Technique Wage Differentials

Several factors contribute to wage differentials within LDC manufacturing. Foreign and government-owned factories generally pay higher wages to production workers (and foreign firms to all their staff). Regional differentials are found in most countries. Finally, wage levels depend on the size of the firm and the technology it employs. In practice it is difficult to identify the importance of each of these factors separately because in many cases they occur jointly. For example, foreign-owned firms usually employ more capital-intensive technology and tend to locate near higher-wage urban centres where the industrial infrastructure is better established. Thus it is not surprising that studies which regress wage levels against these three variables (ownership, technology and location) encounter formidable problems of multicollinearity (see, for example, Manning, 1979:Chapter Seven).
We are concerned with the economic performance of weaving techniques, hence for our purposes it is sufficient to document the magnitude of ITWDs. For each technique, a range of wages is identified. It is not necessary to discuss the causes of these intra-technique variations, except at a fairly general level. It should also be noted that we shall present our own wage data rather than use the far more detailed information collected by Manning. There are two reasons for this. First, our classification of firms by technique does not correspond exactly with Manning's division. Secondly, the data refer to different time periods. All price data in Chapters Nine and Ten are for 1977, whereas Manning's survey was conducted in 1975/76. In any case, our main purpose is to demonstrate, in broad terms, the magnitude of ITWDs and for this our own wage data are sufficiently accurate.

Table 7.1 presents our findings regarding ITWDs. Wage data are presented for two types of cloth, cambric and sarung (teteron-cotton blend). These goods are produced by firms using each of the major techniques, except that non-automatic power looms (M1) are rarely used to produce sarung. 'Typical' wage levels are given for each technique, which approximate the modal wage. These wage levels will be used in Chapters Nine and Ten to calculate the 'boundary' interest rates within which each technique is economically efficient. The range of typical wages is very wide, from Rp 52,000 for hand loom firms to Rp 240,000 per annum for the fully-automatic mechanised firms, in the production of cambric. The range in the case of sarung is less because hand weavers of sarung receive a higher wage, owing to the greater skill involved compared to cambric.

Manning variously defines size according to workforce, capital-labour ratio and average wages. This study is concerned solely with ITWDs. Whilst in practice the capital-labour ratio and techniques are closely related, this is not always the case.
Table 7.1: Wage Levels by Technique, 1977

<table>
<thead>
<tr>
<th>Technique</th>
<th>Range of Wages (Rp)</th>
<th>'Typical' Wage</th>
<th>Differential (H = 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monthly</td>
<td>Annual</td>
<td></td>
</tr>
<tr>
<td>1. Cambric</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>195 - 300/day</td>
<td>4,333</td>
<td>52,000</td>
</tr>
<tr>
<td>M₁</td>
<td>325 - 450/day</td>
<td>8,750</td>
<td>105,000</td>
</tr>
<tr>
<td>M₂</td>
<td>450 - 600/day</td>
<td>12,500</td>
<td>150,000</td>
</tr>
<tr>
<td>M₃</td>
<td>17,000 - 22,000/month</td>
<td>20,000</td>
<td>240,000</td>
</tr>
<tr>
<td>2. Sarung</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>300 - 400/day</td>
<td>6,770</td>
<td>81,250</td>
</tr>
<tr>
<td>M₂</td>
<td>as for cambric</td>
<td>12,500</td>
<td>150,000</td>
</tr>
<tr>
<td>M₃</td>
<td>&quot; &quot; &quot;</td>
<td>20,000</td>
<td>240,000</td>
</tr>
</tbody>
</table>

Source: Field Research
It should be emphasised that wage differentials are found not just between the mechanised and hand loom sector. Even within the power loom sector they are substantial: the range for cambric is 2.3:1, and that for sarung 1.6:1. As with the technology employed and the availability of finance, it is more useful to think in terms of spectra rather than dualism in discussing wage differentials.

Several points should be made regarding the data in Table 7.1. First, 'wages' refer to total earnings, that is, the base wage plus an estimate of average monthly fringe benefits. Substantial fringe benefits are paid by the larger firms (see section 7.2.2). Secondly, daily wages are for an eight-hour equivalent period. Whilst larger factories maintain strict standards of factory discipline, in smaller firms wages are determined by piece-rates and employee attendance is irregular. Thus daily (eight hour) wages are calculated from piece-rates by using an estimate of weavers' physical productivity. Thirdly, wages are for weaving operators, which may be regarded as a semi-skilled production task. Wages are lower for less skilled tasks (eg. preparation workers, factory cleaners) and higher for more skilled tasks. Finally, because we are including only wage differentials associated with the use of different techniques, a range of wages is given for each technique. As was emphasised above, several other factors determine the magnitude of intra-technique differentials. In addition to ownership, regional wage variations in Java are substantial. (The importance of the latter in the hand loom sector is discussed in greater detail in section 7.3.1 below.)

7.2.2 Payment Systems and the Composition of Wages

Before discussing the reasons for ITWDs in the Indonesian weaving industry, two characteristics of the system of wage

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3 For example, if weavers of cambric are paid Rp 25 per metre and on average one metre of cloth is produced each hour, the daily wage is Rp 200.
payment require some explanation. These are first, the method of determining wages and secondly, the composition of total wages. Both these characteristics differ markedly between large and small firms.

Table 7.2 contrasts the wage payment systems of capital-intensive and labour-intensive firms in our survey. In almost all hand loom firms more than three-quarters of the workforce was paid on a piece-rate basis. A standard is determined for each type of cloth and, subject to a certain minimum quality specification, actual earnings depend on the volume of output produced. Only those workers whose output is difficult to measure (eg. supervisors) are paid on a daily or monthly basis. There is a strong indirect relationship between the capital-intensity of the technique employed and the percentage of the

<table>
<thead>
<tr>
<th>Technique</th>
<th>Number of Firms According to Percentage of Workforce on Piece-Rates</th>
<th>Total Number of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1-50</td>
</tr>
<tr>
<td>M3</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>M2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>M1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>H</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Field Research

The one firm which differed was a special case - a christian mission in Kulon Progo, rural Yogyakarta. In addition to a higher percentage of daily workers, its wage system was very 'welfare-oriented', with food allowances for workers' dependants and annual increments for seniority.
workforce on piece-rates. Whilst piece-rates were used for over three-quarters of the workforce in the majority of small (M₁) power loom firms, none of the firms possessing fully-automatic looms adopted piece-rates. However, earnings of employees in these large mills are still related to output, through the payment of incentives and bonuses in addition to the base wage. One implication of the range of payment systems is the diversity of output and wage levels among employees in hand loom firms as compared to those in larger firms. Differences of up to 2:1 are found for employees nominally working the same period of time. Differences of this magnitude are not found in the large mills, where factory management closely monitors the output of each employee.

The second important characteristic of wages in Indonesia is the relatively high proportion of wages of production workers which is paid in the form of fringe benefits. Fringe benefits encompass a variety of payments, ranging from the provision of medical care and housing, to family allowances and an annual bonus. They are widespread in Indonesia, as a result of payment systems adopted during the colonial era, and also because of the emphasis on payment in kind during the rapid inflation of the 1960s. Payments in kind and allowances are a ubiquitous feature of the wage structure of the civil service, although in recent years the former have been declining (Gray, 1979; Arndt and Sundrum, 1979). The feature of fringe benefits most relevant to our study is the strong correlation that exists between the capital intensity of production technology and the percentage of total labour costs

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5 Fringe benefits are also adopted as a convenient means of disguising substantial earnings differentials between senior management and production workers, thereby maintaining the pretence of an egalitarian wage structure. It also facilitates tax evasion for senior employees. For an extensive discussion of the origins and importance of fringe benefits in Indonesia, using both primary and secondary data sources, see Manning, 1979:Chapters Four and Eight.
paid in the form of fringe benefits (see Table 7.3). This percentage is more than twice as high in power loom firms as in hand loom firms, regardless of whether the annual bonus is included. Moreover, within the power loom sector there are substantial differences between large and small firms. In firms with a capital-labour ratio of Rp 2 million or more the percentage of total wages paid in the form of fringe benefits is more than two-thirds greater than that for firms with a capital-labour ratio of Rp 0.5 million and Rp 2 million. Thus at either extreme the nature of fringe benefits differs greatly. Large capital-intensive mills provide a comprehensive package of benefits constituting up to one-third of employees' income; hand loom firms provide only few rudimentary benefits to their workers.

Fringe benefits are important because they may influence labour productivity. Much depends on the form of the benefit. For example, a rice allowance determined by the number of dependants of the employee will have little effect on worker output. Alternatively, an annual bonus determined with reference to employee performance will have a considerable effect. A useful typology of fringe benefits is that suggested by Manning (1979:301-309), who identifies four groups of benefits. Clearly the link between labour productivity and the percentage of wages in the form of fringe benefits depends on the composition of these benefits.

7.2.3 Towards an Explanation of Inter-Technique Wage Differentials

If institutional factors are not the major determinant of ITWDs, it is necessary to seek alternative explanations for the phenomenon. At least three reasons for the differences may be

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6 These groups are those which affect labour productivity through improved physical well-being, through improved attendance and punctuality, and through a greater incentive to work. The fourth group refers to a wide range of 'welfare' measures which has little effect on productivity.
Table 7.3: Average Percentage of Total Labour Costs Devoted to Fringe Benefits by Mechanisation and Capital Intensity, 1975/76

<table>
<thead>
<tr>
<th>Fringe Benefits</th>
<th>Technique</th>
<th>Capital-Labour Ratio (Rp'000)</th>
<th>All Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hand</td>
<td>Power</td>
<td>&lt; 500</td>
</tr>
<tr>
<td>Annual Bonus and Incentive Payment</td>
<td>3.2 (11)</td>
<td>7.0 (42)</td>
<td>4.2 (13)</td>
</tr>
<tr>
<td>Medical Care</td>
<td>0.9 (8)</td>
<td>2.4 (38)</td>
<td>0.8 (10)</td>
</tr>
<tr>
<td>Allowances in kind</td>
<td>- (13)</td>
<td>8.6 (11)</td>
<td>- (2)</td>
</tr>
<tr>
<td>Housing</td>
<td>4.2 (6)</td>
<td>5.1 (24)</td>
<td>3.6 (7)</td>
</tr>
<tr>
<td>Transport</td>
<td>- (19)</td>
<td>3.5 (19)</td>
<td>- (8)</td>
</tr>
<tr>
<td>All Fringe Benefits Ia</td>
<td>10.2 (11)</td>
<td>22.8 (40)</td>
<td>10.5 (13)</td>
</tr>
<tr>
<td>All Fringe Benefits Ib</td>
<td>7.3 (11)</td>
<td>17.7 (39)</td>
<td>6.6 (13)</td>
</tr>
</tbody>
</table>

Source: Unpublished data kindly made available by Chris Manning

Notes:  
a Includes annual bonus  
b Excludes annual bonus

Bracketed figures refer to the number of firms
adduced. These we shall call the cost structure factor, the labour management factor, and the quality of labour factor.

7.2.3.1 Cost Structure Factor

There is a strong positive relationship between the percentage of labour cost in total costs and the capital intensity of the technique employed. In our survey it was found that for handloom firms producing handicraft cloth, this figure averaged 28 percent. By contrast, for privately-owned firms producing plain cloth on fully-automatic looms the figure was less than eight percent. Moreover, the difference is greater still if the comparison is made for labour cost of unskilled and semi-skilled workers as a percentage of total costs between firms employing different techniques. This is because larger firms have a higher proportion of better paid senior employees (e.g. accountants, heads of division).

It is a well established principle of industrial relations that firms with a lower percentage of labour costs offer less resistance to wage increases. Theories of industrial relations developed in mature industrial societies cannot easily be transferred to LDCs. Nevertheless, it is still correct that, in terms of the various models of wage settlement and collective bargaining (see for example, Cartter, 1964:116-133), the 'cost of agreeing' to wage increases is less for large capital-intensive firms than it is for smaller ones. Thus, regardless of the type of work or employee characteristics, earnings can be expected to be higher the more capital-intensive the technique of production.

7.2.3.2 Labour Management Factor

Problems of absenteeism and labour turnover pose special problems for large factories in predominantly agrarian economies such as Java which are experiencing rapid industrialisation. There is considerable occupational fluidity in the workforce. The majority is employed in the
agricultural sector, but labour use here is highly seasonal. Workers shift between agriculture, self-employment, the urban informal sector and industrial occupations such as weaving. Circular migration and rural-urban commuting, which have received increased attention in the recent literature (Hugo, 1978), are also important phenomena. The majority of the urban workforce still retains close ties with their village of origin (or their parents' village). All these factors militate against a stable labour force for firms.

Large capital-intensive firms are more concerned to minimise labour turnover and absenteeism than smaller ones. In order to ensure low turnover and punctual attendance, one solution adopted by these firms is to offer more attractive working conditions. Thus employees will be less inclined to seek alternative employment and have a strong incentive to maintain good attendance records (in most larger firms bonuses are linked to attendance). Large firms seek to minimise absenteeism and turnover for several reasons. First, they have undertaken large investments in land, building and machinery, and the opportunity cost of expensive fixed capital which remains idle is high. To minimise fixed capital costs per unit of output, high levels of capacity utilisation must be achieved. Indeed, as the following chapters will emphasise, high utilisation is essential if large capital-intensive plants are to be competitive. High labour turnover and irregular attendance result in sub-optimal machine performance. Secondly, the fact that large firms have invested in expensive equipment means that they need trusted employees to operate their machinery. Repair costs can be high if machinery is not properly maintained. Thirdly, these firms

Evidence of the seasonal nature of agricultural employment is provided by the 1971 Population Census. 16.1 million workers were recorded in agriculture during the one week reference period, whereas 23.1 million (an increase of 45 percent worked in agriculture during the harvest season immediately prior to the census count (Jones, 1974:22).
usually give their employees some in-plant training (see section 7.2.3.3). Hence they are anxious that their investment in human capital (however minimal) not be dissipated by poor attendance or rapid turnover on the part of employees.

By contrast, the organisation of most hand loom firms is such that higher rates of absenteeism and turnover are less disruptive to their operations. Fixed capital investment per worker is less, hence the opportunity cost of lower capacity utilisation is not so great. Proper maintenance of looms is not a problem. Usually the number of workers likely to seek employment on a given day can be estimated with reasonable accuracy, and purchases of raw materials adjusted accordingly. 8 In any case, insufficient raw materials is an adequate reason for not being able to offer employment even to fairly regular workers. Perhaps the most serious problem created by high levels of absenteeism is the difficulty in co-ordinating the preparation stages and weaving. Owners of hand loom firms seek to minimise working capital, one element of which is work-in-progress materials. Different attendance rates between workers in different production stages may result in supply bottlenecks. However, operations are sufficiently flexible that employees can be transferred between tasks temporarily.

The findings of Manning (1979) demonstrate the difference in absenteeism and separation rates between high wage mechanised firms and low wage hand loom firms (Table 7.4). 9 The separation rate for hand loom firms is 80 percent greater than that of power loom firms, whilst the absenteeism rate is almost double. The difference between hand loom firms and fully-automatic mills would be even more substantial. Although Manning did not

8 In the smaller hand loom firms especially, a weekly cycle of attendance is not unusual. Attendance is high for two or three days before pay day, peaks on this day, then falls away sharply.

9 Manning (1979:348-349) uses the following definitions. The absenteeism rate is mandays lost owing to absenteeism as a percentage of total mandays (figures are average monthly). The separation rate is the total number of separations during the preceding year as a percentage of the firm's average workforce. The separation rate includes dismissals, but these were found to be very small.
Table 7.4: Average Separation and Absenteeism Rates for Direct Employees by Wage Levels and Mechanisation, 1975/76

<table>
<thead>
<tr>
<th>Average Monthly Wage (Rp)</th>
<th>Separation Rate</th>
<th>Absenteeism Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hand loom</td>
<td>Power loom</td>
</tr>
<tr>
<td>&lt; 5,000</td>
<td>37.4</td>
<td>n.a.</td>
</tr>
<tr>
<td>5,000 - 10,000</td>
<td>34.4</td>
<td>21.3</td>
</tr>
<tr>
<td>10,000 - 15,000</td>
<td>n.a.</td>
<td>21.6</td>
</tr>
<tr>
<td>&gt; 15,000</td>
<td>n.a.</td>
<td>15.4</td>
</tr>
<tr>
<td>All Firms</td>
<td>36.3</td>
<td>20.4</td>
</tr>
</tbody>
</table>

Source: Unpublished data kindly made available by Chris Manning

Note: For definition of Separation Rate and Absenteeism Rate see footnote 9.

n.a. - not applicable

classify weaving firms according to the technique of production in use, average monthly wages are a close proxy of technology. Using this criterion the separation rate for low wage firms (average monthly wage of less than Rp 5,000) was almost 2.5 times that of high wage firms (average monthly wage Rp 15,000 or more). The difference in absenteeism rates was even more marked.

Thus the second reason for ITWDs is the desire of large capital-intensive firms to minimise turnover and absenteeism rates. Conceptually, it might be argued that they offer 'disequilibrium' wages (i.e. above the equilibrium wage), as a means of ensuring regular employee attendance and low turnover. Other measures are also adopted, the most important being the payment of attendance money (premi hadir), for employees who have good attendance records. However, few firms pay annual increments for seniority, nor is the 'life-time employment' system - an important feature of Japanese industry (Dore, 1973) - prevalent. For hand loom firms the costs associated with high absenteeism and separation rates are less.
In any case, the lower wages paid offer little flexibility regarding the wage system - low rates can hardly be depressed still further in order to introduce payments for good attendance.

7.2.3.3 The Quality of Labour Factor

In Chapter Two (section 2.3) it was observed that weaving is not a skill-intensive activity. Most studies of the industry in LDCs emphasise that weaving in modern capital-intensive plants is not a skilled task. The comments of an ILO report on the textile industry in LDCs were quoted on page 18 above. Similarly, a United Nations Industrial Development Organisation report (UNIDO, 1967:117), referring to recent technological developments in the industry, concluded:

Far from becoming more arduous, operative skills are actually becoming simpler with less complicated operations being called for. Thus the training of machine operators can be achieved in a short period of around one or two months.10

Thus at the machine operator level, there is little difference in skill requirements between capital and labour-intensive weaving techniques.

Nevertheless, there are differences in the characteristics of workers employed by different firms. Here also, the survey by Manning provides useful information. Mechanised and non-mechanised firms differ with respect to the type of labour they recruit and the extent of in-plant training they offer to new employees. Table 7.5 provides information on worker characteristics (for loom operators) according to technology employed and firm ownership. A fairly clear picture of the differences between firms emerges. Hand loom firms tend to employ a higher percentage of women, the workforce is on average older, they have generally received less schooling and

10 A similar argument is advanced by another UNIDO report (see UNIDO, 1969:55).
Table 7.5: Workers Characteristics of Direct Employees by Capital Intensity and Ownership, 1975/76

<table>
<thead>
<tr>
<th>Worker Characteristics</th>
<th>Domestic</th>
<th>Foreign</th>
<th>All Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-mechanised</td>
<td>Mechanised Low K/L</td>
<td>Mechanised High K/L</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Mean score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (percentage female)</td>
<td>53</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Percentage married</td>
<td>75</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>Average age (yrs)</td>
<td>29</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Average schooling (yrs)</td>
<td>4.4</td>
<td>6.3</td>
<td>7.8</td>
</tr>
<tr>
<td>Years of service (yrs)</td>
<td>3.0</td>
<td>4.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Percentage of firms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 75 percent of employees urban(^a)</td>
<td>-</td>
<td>39</td>
<td>73</td>
</tr>
<tr>
<td>Percentage experienced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25 percent op. 1 experienced</td>
<td>-</td>
<td>12</td>
<td>78</td>
</tr>
<tr>
<td>&gt; 75 percent op. 1 experienced</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number of Firms</td>
<td>12</td>
<td>26</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Manning, 1979:316

Note: \(^a\) All employees
are predominantly rural-dwellers. Moreover, in all handloom firms in Manning's sample, more than three-quarters of the workforce had prior weaving experience. At the other extreme, foreign firms tend to recruit younger male workers, who are better educated but generally have little factory experience. Characteristics of workers employed in the medium sized mills are somewhere between these two extremes.

The fact that large capital-intensive firms prefer to recruit workers whose skills are relatively more scarce is thus the third reason for ITWDs. The rapid growth of Indonesia's industrial sector since the late 1960s has meant that demand for recent school graduates may have outpaced the increase in supply. In all likelihood this is only a temporary phenomenon; as the supply catches up, ITWDs might be expected to narrow.

Although the larger firms tend to recruit 'higher quality' labour, the difference should not be exaggerated. The higher proportion of urban workers in large mills partly reflects the fact that these mills usually locate in or near major urban centres. Similarly, differences in the sex composition of the workforce are probably more the result of community attitudes and regulations (which are enforced only in the modern sector) regarding the employment of female labour than productivity differences between the sexes. Also, there is some government and community pressure on large firms, particularly foreign firms, to recruit better educated recent school graduates. Finally, there are large intra-technique differences in worker characteristics, particularly between foreign firms and domestic firms employing similar technology (see Table 7.5). Hence it would be mistaken to argue that certain worker characteristics are essential for employment in modern sector mills. The complex issue of the relationship between technology and labour quality is discussed in detail by Manning (1979:Chapter Nine).

An additional difference between the large and small firms relates to the nature of training offered to new recruits. In none of the handloom firms and only one-quarter of the
small power loom firms in Manning's survey did weavers receive formal on-the-job training or a course of instruction. However, such training was given in all firms with 500 or more employees, and one-half gave a course of instruction (Table 7.6).

Table 7.6: Nature of Training for Weavers and Preparation Workers by Firm Size, Technology and Ownership, 1975/76

<table>
<thead>
<tr>
<th>Nature of Training</th>
<th>Firm Size (number of employees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 100</td>
</tr>
<tr>
<td></td>
<td>Hand Loom</td>
</tr>
<tr>
<td>Informal on-the-job</td>
<td>9</td>
</tr>
<tr>
<td>Formal on-the-job</td>
<td>0</td>
</tr>
<tr>
<td>Training Courses</td>
<td>0</td>
</tr>
<tr>
<td>Number of Firms</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Unpublished data kindly supplied by Chris Manning

7.2.4 Segmented Labour Markets and the Choice of Technique

Thus a complex set of factors determines the magnitude of ITWDs. At a general level, they arise because of the heterogeneous nature of the labour market in most LDCs. Manning (1979:383) concludes on the basis of his three-industry case study that the pattern of wage differentials indicates

... the extent of labour market segmentation: large and continuing wage differentials, little mobility between capital-intensive and labour-intensive firms and concentration of workers with different characteristics in each segment.
In a useful series of articles, Breman (1976) has developed the notion of labour market segmentation. He argued that it is misleading to see LDC labour markets as homogeneous and unified entities; in the urban labour market alone he sees four groups of workers:

(a) The 'labour elite', employed by governments and large private firms.
(b) 'Declasse'd individuals, for example scavengers.
(c) The 'petit bourgeois', representing owners of small enterprises and certain one-man firms.
(d) The 'sub-proletariat', the largest group consisting of casual, unskilled labour employed in small-scale enterprises.

Applying this classification to the Indonesian weaving industry, the first group would refer to workers in $M_3$ firms; hand loom weavers would be in the fourth group; the third group might include certain employees in hand loom and small power loom firms.

Thus a 'single' labour market does not exist in LDCs, even in any given region or locality. Labour markets are segmented, much more so than in developed countries. Movement between these segments is limited. This is not only because different firms draw on different segments of the labour market, but also because of recruitment and selection procedures adopted by modern sector firms, and the fact that recent school graduates are generally most reluctant to seek employment in small firms.

7.3 Wages and Working Conditions in the Hand Loom Sector

Advocates of the adoption of labour-intensive techniques sometimes overlook the nature of employment conditions in small-scale industry. There is much discussion of the need for an employment-oriented development strategy for LDCs, but much less on the nature of the jobs to be created. Unquestionably, the provision of employment opportunities is a central goal of economic development. Yet there is little point in creating...
(or protecting) jobs if earnings are so low that workers remain in dire poverty. In dismissing much of the discussion surrounding unemployment in LDCs, Weeks (1973:62) has argued that:

To say that 'unemployment' is a major problem in urban Africa is not only incorrect, it is insulting to most of the labour force.... The vast majority of urban dwellers are working long hours in a debilitating climate while burdened by energy-draining diseases and parasites to earn a marginal income.

The purpose of this section is to examine in greater detail wages and working conditions in the hand loom sector. Are conditions so poor that the closure of these firms should be regarded as a blessing? Should one argue as Timmer (1973:76) did when, in discussing the disappearance of hand pounding of rice in Java, he suggested: "This loss of jobs should be kept in perspective.... Hand pounding is a drudgery and the people obviously welcome its demise"?

7.3.1 The Range of Hand Loom Wages

In discussing the nature of employment in the hand loom sector, it is necessary first to draw attention to the diversity of wage rates. More than in any other sector of the industry, wages in hand loom firms differ with respect to the type of cloth being produced, the location of the firm and the task being performed. Table 7.7 summarises our research findings on hand weavers' wages according to the region and type of cloth produced.11 What are the main conclusions from these data?

First, wages for weavers producing high quality handicraft cloth are significantly above those for the traditional cloth varieties. In Chapter Four the heterogeneous nature of the

11 Wages for workers in the preparation stages are lower (see below).
Table 7.7: Variations in Earnings of Hand Loom Weavers by Region and Type of Cloth, 1977

<table>
<thead>
<tr>
<th>Region</th>
<th>Earnings (Rp/8 hrs)</th>
<th>n&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Yogyakarta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleman</td>
<td>± 200</td>
<td>3</td>
<td>Fairly uniform; producing mainly stagen</td>
</tr>
<tr>
<td>Kulon Progo</td>
<td>150-360</td>
<td>2</td>
<td>Special case. See text</td>
</tr>
<tr>
<td>Fringe city</td>
<td>210-250</td>
<td>2</td>
<td>Producing lurik, table cloths etc.</td>
</tr>
<tr>
<td>City</td>
<td>250-275</td>
<td>1</td>
<td>Some slightly higher quality goods</td>
</tr>
<tr>
<td>2. Central Java</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedan</td>
<td>195-240</td>
<td>8</td>
<td>Cambric in lower part of range; lurik and sarung slightly higher</td>
</tr>
<tr>
<td>Jepara (rural)</td>
<td>250-800</td>
<td>5</td>
<td>Cambric, mosquito netting 250-300, even for small firms.</td>
</tr>
<tr>
<td>Pekalongan (rural)</td>
<td>275-375</td>
<td>3</td>
<td>Sumba cloth 600-800, Bali cloth 400-500</td>
</tr>
<tr>
<td>Pekalongan (city)</td>
<td>350-750</td>
<td>4</td>
<td>Blaco lower (275-300); sarung TC higher (325-375)</td>
</tr>
<tr>
<td>Solo</td>
<td>240-375</td>
<td>3</td>
<td>Sarung TC lower (350-450); rural - urban wage differences confirmed by firms putting out sarung TC to villages. Name towels ± 500; special cloth designs, 600-750. Cambric, blankets 240-275; higher quality sarung 350-375</td>
</tr>
<tr>
<td>3. West Java</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Majalaya</td>
<td>350-400</td>
<td>3</td>
<td>Sarung TC upper part of range; serviettes, etc. lower</td>
</tr>
<tr>
<td>4. Jakarta</td>
<td>± 16,000/month</td>
<td>1</td>
<td>High quality artistic designs</td>
</tr>
<tr>
<td>5. Bali</td>
<td>350-450</td>
<td>3</td>
<td>Bali cloth. Denpasar-Gianyar similar</td>
</tr>
</tbody>
</table>

Source: Field Research

Note: a Number of firms in sample
hand loom sector was emphasised. Despite the general decline, a few firms producing high quality cloth are prospering (see Appendix 4.3). Higher wages in these firms are not because of regional factors, as Table 7.7 demonstrates. Rather, they are a result of the greater skill required in the production of this cloth and its profitability. In most of the regions producing handicraft cloth, traditional varieties are also woven, and it is not uncommon to find wage differences for weavers of up to 3:1 within districts and even within firms. Indeed, the earnings of handicraft weavers are greater than those in small power loom firms ($M_1$) and even some of the medium power loom firms ($M_2$). However, in other respects, their conditions of employment are more akin to those in the hand loom sector: piece-rates are used, little job security exists, work is not always available and working conditions are very rudimentary.

The second interesting finding in Table 7.7 is the regional variation in hand loom wages. Discussions of regional wage differentials in Indonesia are usually in the context of differences between Java and the Outer Islands, or Jakarta and other urban centres in Java. The latter usually emphasise the difference between high wages in Jakarta, and Central Java and Yogyakarta, which are two of the poorest provinces in Indonesia. However, less attention has been given to intra-provincial wage differentials. Table 7.7 indicates that just within the region of Central Java (although administratively separate, Central Java and Yogyakarta may be regarded as one region), hand loom wages vary significantly. Weavers' earnings in and around the northern coastal towns of Pekalongan and Jepara are well above those in the south-central districts of

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12 Wages paid to unskilled and semi-skilled workers in the kabupaten public works program in Central Java and Yogyakarta were the lowest of the 24 provinces for which data were available in 1971 (Arndt, 1972:90). A similar conclusion is reached from wage data for unskilled construction labourers in 10 provincial capitals over the period 1972-1977 (Leiserson, 1978:62).
Solo, Pedan and Yogyakarta. For the same type of cloth, they are between 50 and 100 percent higher in the north.\(^{13}\)

The reasons for the difference are beyond the scope of this thesis, but it should be noted that there is no evidence to suggest that the cost of living is lower in the southern districts. Monthly price data for 30 major commodities are collected by the Central Java Office of Statistics for each kabupaten and city. These data suggest that, if anything, the cost of living may be slightly lower in the northern districts.\(^{14}\) How, then, can the difference be explained? For centuries, writers have drawn attention to the linguistic and religious differences between north and south Central Java (see, for example, Schrieke, 1954). But the evident economic differences — with regard to both entrepreneurship and wage levels — have gone relatively unnoticed.\(^{15}\) The continued existence of intra-regional wage differentials provides additional evidence in support of the belief that factor markets in Indonesia are segmented.

7.3.2 How Low are Hand Loom Wages?

Clearly, weavers producing handicraft cloth receive quite high wages. But for traditional cloth varieties, earnings are very low, in some cases as little as 50 cents (Rp 200) per day. It is difficult to select a yardstick by which to evaluate

\(^{13}\) Additional evidence to support the finding of north-south real wage differentials is provided by the wage data for labourers in the public works program during 1975/76. The average daily wage for the 13 kabupatens and cities in south-central Java was Rp 179. That for the 12 northern kabupatens and cities averaged Rp 277 — or more than 50 percent higher. (The data on wages were collected by Bappenas.)

\(^{14}\) For example, an unweighted index of prices for the 15 major food items in July 1978 (putting Jepara = 100) was as follows: Jepara (north) 100, Pekalongan (north) 102, Klaten (south-central) 104, Magelang (south-central) 110. (Calculated from Indonesia. Kantor Sensus dan Statistik Jawa Tengah, 1978:12-13.) Similarly, an unweighted index of 15 major non-food items showed little difference between kabupatens.

\(^{15}\) Differences between the weaving industry in Pedan and Pekalongan were discussed briefly in Chapter Four (section 4.9).
earnings in a low wage activity in one of the poorest countries in the world. In this section, earnings in the production of traditional cloth varieties are considered first in relation to the concept of minimum physical needs, and secondly in comparison with other income earning opportunities outside the modern sector. It will be concluded that, low as wages in the handloom sector are, they are generally higher than those in alternative low-income occupations.

7.3.2.1 Hand Loom Wages and the Poverty Line

There are formidable definitional and conceptual problems in attempting to measure poverty in LDCs. In Indonesia, two main measures have been used in recent years. One is the minimum physical needs (kebutuhan minimum fisik) approach devised by the Department of Labour. This involves estimating the rupiah income required to sustain an average sized family at some minimum standard of living (for a discussion of the concept see Manning, 1979:430). Another more widely used and easily applied measure is the poverty line (garis kemiskinan) drawn up by Sajogyo (1975, 1977). This measure, based on a household expenditure survey in the early 1970s, defines the minimum monthly absolute requirement as 20 kilograms milled rice equivalent (m.r.e.) for adults living in rural areas. The level for urban areas is 50 percent greater (30 kgs), reflecting the higher cost of non-food items and the absence of house gardens (pekarangan) to which even most of the rural poor have access. The choice of rice as the unit of measure is justified on the grounds that it

... plays a key role in food patterns and society's living standards in Indonesia in

16 In a subsequent modification (Sajogyo, 1977:4), the poor (miskin) are defined as having an annual income of less than 320 kgs m.r.e., the very poor (miskin sekali) 240 kgs m.r.e. and the destitute (paling miskin) 180 kgs m.r.e. Here also the levels for urban areas are 50 percent higher. Penny and Singarimbum (1973:3) adopt a similar measure to Sajogyo's original definition (20 kgs m.r.e. per month) in their definition of cukupan ("enoughness") as an income of 1,200 kgs m.r.e. per year for a family of five.
general: the measure facilitates inter-regional and inter-temporal comparisons (Sajogyo, 1975:62).17

If rice prices are known, rupiah wages may be converted to milled rice equivalents, thereby enabling a comparison between handloom wages and the poverty line. To obtain a comprehensive picture of the incomes of weavers, ideally one would want data on family size, family income and the nature of extended family support systems; however, it was not possible to collect extremely detailed information of this nature during fieldwork. As an alternative, therefore, wages can be expressed in terms of the number of adult male equivalent consumers who can be supported on the daily wage.18 Table 7.8 presents average wage data for each of the main weaving districts, for weavers and preparation workers. Using the price then prevailing for medium quality rice (col. (2)), wages are expressed in terms of kilograms of rice (col. (3)). In columns (4) and (5) the number of adult male consumers who could be supported at the poverty line is calculated.

Two points should be made regarding the data in Table 7.8. First, preparation workers are mainly teenage children and older women. Converting their wages at the 'adult male equivalent' poverty line effectively understates the number of consumers their earnings could support. Secondly, urban wages are converted using both the rural and urban definitions of absolute needs. Frequently employees in urban handloom firms commute daily from villages, or reside temporarily in the town. Although employed in an urban area, the relevant yardstick for these workers is probably rural living costs.

What conclusions can be drawn from Table 7.8? Using the rural poverty line, weavers are able to support between two and four adult males. Indeed, in the 'higher wage' districts

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17 For a good general discussion of some of the issues involved in using the measure, see Ginting, 1978:39–58.
18 Adult female consumers are usually given a weight of 0.9 of male adults, and children a weight of 0.6.
### Table 7.8: Hand Loom Wages and the Poverty Line by Region, 1977

<table>
<thead>
<tr>
<th>Region</th>
<th>Wage(^a)</th>
<th>Rice Price/(^c) kg</th>
<th>Wage (kg of rice)</th>
<th>Number adults supported on poverty line by daily wages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4) Rural (5) Urban</td>
</tr>
<tr>
<td>1. Weavers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogyakarta (R)</td>
<td>200</td>
<td>142</td>
<td>1.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Yogyakarta (U)</td>
<td>250</td>
<td>142</td>
<td>1.8</td>
<td>2.7</td>
</tr>
<tr>
<td>Pedan</td>
<td>210</td>
<td>150</td>
<td>1.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Solo</td>
<td>250</td>
<td>150</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Jepara</td>
<td>275</td>
<td>150</td>
<td>1.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Pekalongan (R)</td>
<td>320</td>
<td>150</td>
<td>2.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Pekalongan (U)</td>
<td>375</td>
<td>150</td>
<td>2.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Majalaya</td>
<td>375</td>
<td>163</td>
<td>2.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Bali</td>
<td>375</td>
<td>145</td>
<td>2.6</td>
<td>3.9</td>
</tr>
<tr>
<td>2. Preparation Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogyakarta (R)</td>
<td>110</td>
<td>142</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Yogyakarta (U)</td>
<td>125</td>
<td>142</td>
<td>0.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Pedan</td>
<td>110</td>
<td>150</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Solo</td>
<td>125</td>
<td>150</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Jepara</td>
<td>125</td>
<td>150</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Pekalongan (R)</td>
<td>125</td>
<td>150</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Pekalongan (U)</td>
<td>160</td>
<td>150</td>
<td>1.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Majalaya</td>
<td>160</td>
<td>163</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Bali</td>
<td>150</td>
<td>145</td>
<td>1.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Sources: Wage data - field research  
Rice price data - B.P.S. Indikator Ekonomi, August 1977

Notes:  
\(a\) wage data refer only to traditional cloth varieties  
\(b\) for definitions, see text  
\(c\) rice prices are those prevailing in August 1977 for medium quality rice in the provincial capital city. (Intra-provincial price variations in Java are not great.) Note that for Yogyakarta Indikator Ekonomi gives a price of Rp 128, whereas Indikator Ekonomi Jawa Tengah gives a price of Rp 142. The latter price is used here.
of Pekalongan, Majalaya and Bali, wages would be sufficient
to support a family of five. (However, as we argue above, it is
not useful to view wages through the western concept of one
income-earner per household.) In the poorer districts of south-
central Java wages are lower, although in all cases sufficient
to support at least two adult male consumers on the poverty
line. The lower wages for preparation workers reflect the
type of workers who perform these tasks. Most would have fewer
dependents. Thus, it can be concluded that in most regions
hand loom wages exceed this (very modest) poverty line by a
substantial margin.

Although Sajogyo's definition is a useful measure of
poverty, which also facilitates inter-temporal comparisons of
real income, there are several problems associated with its
use. First, rice prices tend to move in discrete steps rather
than small continuous adjustments. Its price is to some
extent administered by the government's food marketing authority,
BULOG, which engages in extensive open market operations. In
making inter-temporal comparisons, it may be necessary to use a
long term trend price rather than the market price prevailing
at a given period. Secondly, although inter-provincial price
variations are quite small (at least in Java and Bali),
intra-provincial and even intra-kabupaten variations do exist.
These generally arise if the village agricultural co-operatives
are unable to execute their procurement and distribution
functions. Thirdly, medium quality rice may not be the
appropriate yardstick by which to measure incomes of the
poor. The poor are unable to eat rice all year round, the very
poor and the destitute perhaps rarely. These groups are
forced to switch to lower grades of rice, or inferior food

19 In the Sriharjo study by Penny and Singarimbun, none of the
families of the poorest farmers (which constituted one-
quarter of all farmers) ate rice for more than five months
of the year (Ginting, 1978:52).

20 The actual range of rice prices is far greater than that
suggested by official price data, and can be as great as 2:1
if low quality manir (broken rice) is included.
staples such as maize or cassava. Using medium quality rice as the yardstick actually understates the effective income of the poor, because it is an 'inefficient' means of purchasing calories.

7.3.2.2 Alternative Income Opportunities Outside the Modern Sector

Another way of looking at handloom wages is to compare them with earnings in other non-agricultural activities outside the modern sector. Several studies of incomes in the small-scale sector have been undertaken in various regions of Indonesia over the last decade but, as already noted, there are difficulties in inter-temporal comparisons. Perhaps the best known is the study of the poor in Jakarta undertaken by the Faculty of Economics, University of Indonesia in 1972. This survey found that the average daily income for all occupations except prostitutes was Rp 250 or, at the then prevailing rice prices, 5 kgs m.r.e. (Papanek, 1975:3). But Jakarta is a 'high wage' centre, and one would expect wages to be considerably above the earnings of weavers in the smaller cities and villages of Java.

A more accurate indication of handloom wages relative to other occupations can be obtained by comparing the wage data from Manning's survey of the weaving industry with three other income studies of the same period. These are the kabupaten wage data for unskilled labourers already referred to, a detailed study of small-scale traders and craft workers in rural Yogyakarta by Peluso (1977), and Manning's wage data for the kretek cigarette industry, an industry which is a very large employer of labour in Central and East Java (Table 7.9). Handloom weavers' hourly earnings are relatively high compared to most of the other occupations. They are well above those of cigarette rollers (who are amongst the higher paid of piece-rate workers in kretek factories) in small and medium firms, and craft workers and daily labourers in Yogyakarta. They are slightly below that of traders, and labourers in Central Java. However, if one were to separate out returns to capital (however minute the investment) and returns to labour, the earnings of
Table 7.9: Hourly Earnings in Small-Scale Non-Agricultural Activities, 1975/76

<table>
<thead>
<tr>
<th>Activity</th>
<th>Wage/hour (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weaving firms, with &lt; 60 employees, average direct wages&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28</td>
</tr>
<tr>
<td>- , preparation workers in hand loom firms</td>
<td>18</td>
</tr>
<tr>
<td>2. Kretek cigarette rollers:</td>
<td></td>
</tr>
<tr>
<td>- small firms</td>
<td>17</td>
</tr>
<tr>
<td>- medium firms</td>
<td>18</td>
</tr>
<tr>
<td>3. Kabupaten Program - labourers&lt;sup&gt;b&lt;/sup&gt;:</td>
<td></td>
</tr>
<tr>
<td>- Yogyakarta</td>
<td>24</td>
</tr>
<tr>
<td>- Central Java</td>
<td>34</td>
</tr>
<tr>
<td>4. Rural Yogyakarta: craft workers</td>
<td>17</td>
</tr>
<tr>
<td>- all inside occupations</td>
<td>21</td>
</tr>
<tr>
<td>- all occupations</td>
<td>28</td>
</tr>
<tr>
<td>- all traders</td>
<td>31</td>
</tr>
</tbody>
</table>

Sources: 1. Manning, 1977  
2. Manning, 1977  
3. Wage data compiled by Bappenas  
4. Peluso, 1977

Notes:  
<sup>a</sup> Includes two small power loom firms, but Manning's survey did not include the higher wage weaving districts on the north coast of Central Java  
<sup>b</sup> Calculated from daily wage
weavers and traders may well be similar. In the agricultural sector, few detailed studies have been undertaken regarding wage rates for daily labourers.21

Although hand loom wages are abysmally low, the conclusion is inescapable that they are not among the lowest in Java. Weavers' earnings are modestly above the 'poverty line' in Indonesia, and several other low wage occupations. This applies particularly to the hand loom industry on the north coast of Central Java, Majalaya and Bali. Certainly, one would hope that low income occupations such as hand loom weaving would disappear as Indonesia's economy develops and real wages begin to rise significantly. For the present, however, weaving is far from being the least desirable occupation in Java.

7.3.3 Wage Levels and the Future of Hand Loom Weaving

Discussions about the role of and prospects for small-scale labour-intensive activities in LDCs correctly emphasise that one of the keys to their survival is the supply price of labour. They are able to compete with larger firms, it is argued, because in labour surplus economies wages are very low, particularly during slack agricultural periods. Undoubtedly, this proposition is of relevance to hand loom weaving. However, in this section it will be argued that low wages - below the levels currently prevailing - will not necessarily enhance the competitive prospects of hand loom weaving. This is because of the importance of the link between low wages and poor nutritional standards on the one hand, and low labour productivity and poor product quality on the other.

There are frequent references to the importance of low wages in explaining the continued existence of small-scale industry.

21 In one such study, Penny and Singarimbun (1973:44) report that the going wage for daily labour - when work is available - is about .8 kg m.r.e. This is for two pecat (six hours), hence an eight hour equivalent would be 1.1 kg m.r.e. This is well below the earnings of weavers in Yogyakarta, and Penny and Singarimbun emphasise that the village studied is in a relatively well-off district of Yogyakarta.
Lewis (1955:137) suggested that cottage industries survive because their "costs of production, in terms of alternatives foregone, are so low that they can stand very severe competition". More recently, a stimulating essay by Kang Chao (1975) addressed the question of why, after the introduction of power looms into China in the late nineteenth century, hand looms remained competitive throughout the period prior to 1949. He rejected the usual explanations of product specialisation between the hand and power loom sectors, or inter-regional transport costs creating 'natural protection' to weavers in less accessible districts. The major factor, he asserted, was the absence of alternative income earning opportunities for weavers for much of the year. Consequently they were forced to accept very low returns to their labour:

The handicraft textile industry survived not because there existed two separate, non-interchangeable demands, but because the handicraft sector and the modern sector were using two non-competing sets of resources.... The handicraft industry could meet head-on competition from the modern sector at almost any price as long as enterprises in the modern sector had to pay subsistence wages to their workers (Kang Chao, 1975:179-180).

Essentially, Kang Chao adopted a variant of the disguised unemployment hypothesis and applied it to the textile industry. Factories will hire labour only if the wage is less than the marginal value product of labour (MVP_L), and this wage must exceed some minimum subsistence level. By contrast, household members will consume resources regardless of whether they are income earners. If no other income opportunities are available the opportunity cost of labour is zero, and thus labour may be employed until the MVP_L is zero.  

22 A separate issue is why households would choose weaving as against other activities, and how low the opportunity cost of labour in rural areas really was. Kang Chao is less specific on these questions, although he does note that the labour productivity differentials between hand and mechanised techniques were much less in weaving than in spinning and some other industries.
How relevant is this argument to the Indonesian weaving industry? If the opportunity cost of family labour is indeed close to zero, households can be expected to engage in cottage industry. However, the notion of disguised unemployment as a source of 'costless' labour is viewed with scepticism by economists (see, for example, Robinson, 1969), and we saw in Chapter Four (section 4.5) that household weaving is not widespread in Java. More generally, low wages should not necessarily be seen as a factor which guarantees the survival of handloom weaving. There is a point beyond which wages are so low as to have a deleterious effect on labour productivity. The link between nutritional standards and labour productivity is only imperfectly understood. Writing in the mid 1960s, Myrdal (1968:1616-1617) noted that there had been "practically no effort" to quantify the relationship, although a few experimental studies suggested that "sub-optimal food intake has a very marked effect on people's ability to work".23

The previous section pointed out that weavers' earnings in Indonesia are substantially above minimum subsistence requirements and also greater than those in several other low wage occupations. Nevertheless, at wages below current levels, the productivity of weavers would almost certainly begin to decline. This is because of the type of working conditions and the nature of the production process. Handloom weaving is an arduous physical task. Weavers, usually seated on stools, push a wooden beam forward and back to propel the shuttle, which carries the cross thread (weft) across the warp. Working conditions are poor; in most cases the shed is a simple bamboo (gedek) construction, which by mid-morning becomes very hot. In addition, weavers frequently live far from their place of work, thus long walks each day are involved.24 (Bicycles are

23 Among the few economists to draw attention to the relationship before the 1960s was Leibenstein, 1957.

24 For example, many of the handloom workers in the town of Majalaya (West Java) live in the poor mountainous areas nearby. Each day they commute by foot to Majalaya, a distance of six to eight kilometres. For a working day of seven to eight hours, workers must leave home before dawn and return home after dusk.
a luxury which few weavers could ever hope to own. Even a second-hand bicycle not in good repair would be more than one month's wage for weavers.)

There is thus a direct link between worker effort and the quality of hand loom cloth. Inevitably, this cloth is of uneven density (kurang rata). In contrast to weavers using even the simplest mechanised looms, hand loom weavers are not able to ensure an even quality. The density of the cloth depends literally on how hard the weaver pushes the beam: the beam does not have to be pushed vigourously, but consistency of effort is required. Consequently lower wages, which would result in poorer nutritional standards for weavers, could be expected to adversely affect the quality of hand loom cloth.

7.4 Conclusion

This chapter has examined wages and conditions of employment in the Indonesian weaving industry. The first section considered the reasons for substantial ITWDs found in the industry. We emphasised that wage differentials between firms depend on several factors but, as this is a choice of technique study, our primary focus is on wage differentials that occur with respect to different techniques. It was argued that institutional factors are one of the determinants, but that they are probably less important than the literature on LDC labour markets suggests. Three alternative explanations were discussed - the cost structure factor, the labour management factor and the quality of labour factor. It was emphasised that the skills required of weavers in capital-intensive and labour-intensive firms do not differ substantially. Nevertheless, modern sector firms tend to recruit workers whose characteristics differ from employees in the small-scale sector.

25 The problem of uneven cloth quality applies particularly to hand-woven cambric. Defects in plain grey cloth are more easily detected than is the case with patterned, coloured cloth (eg. sarung).
Conversely, there are substantial *intra*-technique variations in worker characteristics, particularly between foreign and domestic firms.

The second section examined working conditions in the hand loom sector in more detail. Wages in hand loom firms are shockingly low by western standards. Yet it was argued that they are above a 'minimum physical needs' standard, and higher also than incomes in many alternative low income occupations. Nevertheless, it was concluded that if wages were to fall substantially, labour productivity might be impaired. Hence, models which suggest that labour intensive techniques can continue to compete with modern technologies because the supply price of labour to the former is flexible downwards (at least to a certain limit) may be of limited relevance to the weaving industry.

Two important implications for our choice of technique analysis arise out of this examination of the labour market. First, there are large ITWDs, and these must be taken into account. Specifically, the assumption that wages are invariant to the technology in use - a feature of many choice of technique studies - is quite mistaken. Secondly, in the calculation of 'boundary prices' (wage and interest rates within which a given technique is competitive), it must be recognised that there are limits to which wages may be altered without affecting labour productivity, especially in the case of small low-wage firms. This issue is also overlooked in much of the choice of technique literature; it is qualification we shall bear in mind in later chapters.
CHAPTER EIGHT

THE CHOICE OF TECHNIQUE: SOME METHODOLOGICAL CONSIDERATIONS

8.1 Introduction

Previous chapters have discussed in detail the structure of the Indonesian weaving industry, the effect of government policies and the nature of factor markets in the industry. We are now almost in a position to compare the economic performance of the four main techniques in the industry, given a range of assumptions regarding factor prices and policy regimes. Before making this comparison however, it is first necessary to discuss the methodological framework in which the analysis is to be conducted. The purpose of this chapter is to provide a rationale for the method of analysis of the following two chapters. The importance of a sound methodological framework can hardly be over emphasised. There is considerable scepticism among economists regarding the validity of the neo-classical approach to the choice of technology and, moreover, whether it can be applied to real world situations. Our use of basic neo-classical tools of analysis thus requires careful justification. Furthermore we are critical of the methodology of other choice of technique studies. For this reason also, it is necessary to provide a detailed elaboration of our method of approach.

Section 8.2 examines the methodology and findings of other choice of technique studies in LDC weaving industries, and discusses some of their limitations. Section 8.3 considers the relevance of one measure commonly used as a criterion for assessing the performance of different techniques - the capital-output ratio - and concludes it is inadequate. Section 8.4 summarises the standard neo-classical approach to the choice of technology and the modifications necessary to transform it into an operational tool of analysis. Finally, Section 8.5 considers the limitations and criticisms of the neo-classical approach, and their relevance to the Indonesian weaving industry. It will be argued that, despite the validity
of some of these objections, none is sufficiently strong as to suggest that this approach may not be adopted.

8.2 Empirical Evidence on the Choice of Technique in LDCs

8.2.1 The Approach

The increased emphasis accorded to the issues of choice of technology and factor substitution possibilities in LDCs over the last decade has given rise to two main types of studies. The first is econometric investigations of labour-capital substitution, using a CES (Constant Elasticity of Substitution) production function. These studies, which have been conducted in many LDCs for numerous manufacturing industries, use secondary data to estimate the elasticity of substitution of labour for capital. The general conclusion is that considerable substitution possibilities exist in most industries. Owing to data problems however, there are serious doubts regarding the usefulness of such studies. There is little consistency in the ranking of industries between different studies; information may not be available for all techniques in use; the quality of the data is generally poor, particularly in the valuation of capital and because of the tendency for firms to understate their value added for taxation reasons; and the analysis is conducted at a highly aggregated level, in many cases not beyond the three-digit level of industrial classification. It was pointed out above that textiles includes many disparate industries, hence a disaggregated approach is desirable. Undoubtedly this also applies to many other industries. (For a useful review and critique of these studies, see Morawetz, 1976.)

A second, more fruitful method of approach consists of case studies of particular industries, which gather a wide range of engineering and accounting data. This is the approach adopted in our study. Its advantage is that, providing the research is conducted in a thorough and sensitive manner, a comprehensive picture of the industry and the range of techniques in use emerges. The disadvantages are of course, that, owing to the
greater research input required, it is expensive, time-consuming and frequently very frustrating. It is not surprising, therefore, that fewer studies of this type have been undertaken.

Given these disadvantages and the general difficulties associated with conducting detailed field research in LDCs, some industry case studies have attempted to graft LDC data onto information obtained in western countries. This often involves obtaining basic information about machine prices and productivity from western machinery suppliers or from studies undertaken in developed countries. The data are then combined with a range of factor prices thought appropriate for LDCs. The methodology employed in these studies is of interest and their conclusions may be of relevance if the practitioner has a good knowledge of conditions in LDCs. There is a danger however, that these studies underestimate the problems of applying such information to countries whose economic, political and social environments are very different from those of the source country. Just in the performance of machinery, for example, output per shift, capacity utilisation, economic life and labour: machine ratios may differ enormously. These variables fluctuate considerably between developing countries (eg. see the results of the three country study of choice of technique in can making by Cooper et al., 1975), let alone between developing and developed countries.

In fact, the transferability of western data to developing countries was the focus of a study undertaken in Indonesia and the United States in the early 1960s, when the performance of two cement plants of similar scale and technical specifications was compared. The conclusions of the study are instructive: not only was output in the Indonesian plant well below that of the American plant, but much additional social overhead capital - ranging from the provision of an ocean dock and oil storage facilities to the construction of schools - had to be provided by the Indonesian plant. This led the author to
conclude that

In terms of investment per ton of production capacity, the Gresik [Indonesian] plant started with a capital cost disadvantage of approximately 3.3 times that of the Cushenberry [U.S.A.] plant (Doyle, 1965:46; my emphasis).

Moreover, actual output in the American plant was considerably above that of the Indonesian plant. The problems of using data obtained in other LDCs are less serious, but the results of such studies must also be interpreted with caution.¹

8.2.2 Choice of Technique Studies in the Weaving Industry in LDCs

There have been at least six major studies on various aspects of choice of technique in the weaving industry in LDCs over the past 15 years. Summary information regarding the region, scope, data sources and limitations is provided in Table 8.1. A general conclusion of all studies is that less capital-intensive techniques are preferred, if not at current prices then at some set of 'notional' prices which the authors consider better reflect the opportunity cost of resources in LDCs (none of the studies explicitly introduces shadow prices).

The two studies which include both manual and mechanised techniques (Karanshawy, Sen) conclude that handloom weaving is the preferred technique, at market prices. Sen, in his study of the Indian weaving industry, conducted the analysis in terms of capital-output and capital-surplus ratios. He found that the more primitive of the two handloom techniques had the lowest ratio, even with the inclusion of working capital in total capital stock. Karanshawy compared the two techniques in the Egyptian industry by discounting their future cash flows to

¹ But in one study relying primarily on secondary data the initial tentative conclusions regarding the poor technical performance of the manual technique were reinforced in a subsequent exchange of views (see Timmer, 1973, and Collier, et al., 1974).
Table 8.1: A Summary of Choice of Technique Studies in the Weaving Industry

<table>
<thead>
<tr>
<th>Study</th>
<th>Country/ Region</th>
<th>Coverage</th>
<th>Data Sources</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Nations, ECLA (1966)</td>
<td>Latin American</td>
<td>Cotton Spinning &amp; Weaving. 3 techniques, all automatic</td>
<td>'Model mills'</td>
<td>V.A./m same for all techniques</td>
</tr>
<tr>
<td>Karanshawy (1975)</td>
<td>Egypt</td>
<td>Carpet weaving. 2 techniques - 1 manual, 1 mechanised</td>
<td>'Synthetic mills', based on small sample</td>
<td>As for ECLA. Special good.</td>
</tr>
<tr>
<td>Pack (1978)</td>
<td>Developing Countries</td>
<td>Spinning &amp; Weaving. 5 techniques, all automatic</td>
<td>Developed country data</td>
<td>As for ECLA. Developed country data. Life of used machinery.</td>
</tr>
<tr>
<td>Pickett and Robson (1977)</td>
<td>Africa</td>
<td>Cotton Spinning &amp; Weaving. Only automatic techniques</td>
<td>Developed country, ECLA and limited African data</td>
<td>As for ECLA (partly)</td>
</tr>
<tr>
<td>Rhee and Westphal (1977)</td>
<td>South Korea</td>
<td>Weaving. Automatic &amp; Semi-automatic techniques</td>
<td>Primary data</td>
<td></td>
</tr>
<tr>
<td>Sen (1968)</td>
<td>India</td>
<td>Cotton Weaving. 5 techniques, from hand to automatic power loom</td>
<td>Secondary (Indian) data</td>
<td>As for ECLA. No 'cost-effectiveness' analysis</td>
</tr>
</tbody>
</table>
obtain a net present value for each, and then conducted sensitivity analysis by allowing interest rates and the exchange rate to fluctuate within a predetermined range. The main conclusion was that power looms are competitive only if supported by a considerable sales promotion effort at the expense of hand looms.

The four other studies consider only mechanised weaving techniques. The main concern of Pickett and Robson was to demonstrate inter-continental differences in the performance of the techniques, in particular the low level of efficiency in the African mills compared to similar European mills. Hence the results are of limited relevance to our study. The study by Rhee and Westphal attempted to estimate the effects of government assistance to firms in South Korea using automatic (and predominantly imported) looms and producing for the export market, during the early 1970s. By decomposing factor price distortions into those due to government policy and those due to market structure, they concluded that:

Except for the production of very wide cloth, the indigenous semi-automatic technology appears to be the socially optimal choice of technology. And ... there is nothing to suggest that this technology would not have been chosen by net worth maximising producers under a more appropriate set of policies (Rhee and Westphal, 1977:235).

The ECLA study compared three mechanised techniques of different vintage on the basis of 'model' mills (the meaning of model mills in this context is not clear). It concluded that the oldest vintage had the 'best' (i.e. lowest) capital-output ratio, but that the most modern vintage was the lowest-cost technique at interest rates up to 16 percent.

The study by Pack is of considerable analytical interest. Sensitivity analysis was employed, in which three variables were introduced - the wage rate, interest rate and the price of second-hand power looms of older vintage as a percentage of the new price of the most modern vintage (this is introduced as a
variable in the absence of reliable price information). Pack's main conclusion was that second-hand mechanised looms are optimal over a wide range of factor prices prevailing in LDCs. For example, at a wage rate of $300 per annum and an interest rate of either nine or 19.5 percent, he concluded that the price of second-hand looms of older vintage could be up to 36 and 74 percent respectively of that of modern looms and still be socially optimal.

These studies raise many interesting issues, and one result is that the scope for factor substitution in the weaving industry in LDCs is better understood. Nevertheless, some of the studies have shortcomings which limit their usefulness. We have emphasised the necessity of adopting a disaggregated approach in choice of technique studies. Actual production conditions, the nature of factor markets and specific government policies - in short the institutional setting - must be thoroughly understood. If such a painstaking methodology is not employed, there is a danger that quite misleading conclusions will be reached. Policy makers in third world countries are entitled to expect that accurate data are used and realistic assumptions adopted.

In general, there are four main weaknesses of existing choice of technique studies in the weaving industry. First, although they are all by definition highly disaggregated, only three relate specifically to a developing country (Karanshawy, Rhee and Westphal, and Sen). Moreover, just two use primary data collected on the basis of factory visits (Karanshawy, Rhee and Westphal), and the former is apparently based on a very limited survey. The discussion above emphasised the pitfalls of attempting to superimpose local price information on

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2 This wage is well below that used in the next two chapters for automatic looms (M₃) of Rp 240,000 per annum ($578). However, it is closer to that of our second most capital-intensive technique (M₂) which is Rp 144,000 ($347).
secondary data from other countries. The performance of plants in western economies may bear little relation to their likely performance in LDCs. The difference may well be so substantial that the results of studies using secondary (western) data must be interpreted with great caution.

Secondly, the range of weaving techniques analysed is limited. In three of the studies (ECLA, Pack, and Pickett and Robson), only automatic looms are considered; the comparison relates to looms of similar type but different vintage. In fact only Sen, who examines two hand loom and three power loom techniques, includes a range of techniques comparable to that of our study. The inclusion of a narrow range of techniques is a serious limitation because, as we have pointed out, weaving in most LDCs is a technologically diverse industry. Not only are modern, capital-intensive techniques generally in use in the larger mills, but traditional techniques remain important. Restricting the range of techniques considered means that the study is less relevant to LDCs. Comparing only the modern techniques is also another limitation of studies based on secondary data from the west. The more labour-intensive techniques are in use only in LDCs. To analyse the performance of these techniques, researchers must obtain LDC data.

A third major weakness is that some of the studies assume that different techniques produce the same quality product. Specifically, they assume that value added per metre of cloth is the same, regardless of the technique in use. This is an unrealistic assumption because differences occur in product quality - and therefore selling price and value added - and input prices, between techniques (see section 8.4 and Chapter Nine below). For the three studies where the range of techniques considered is limited (ECLA, Pack, and Pickett and Robson) this assumption, although incorrect, may not lead to
serious errors in the conclusions. For the two studies which include both power and hand looms (Karanshawy, Sen) however, it is so unrealistic as to cast major doubts on their findings.

A fourth limitation is that several of the studies assume that firms employing different techniques face the same wage/interest ratio. However, as the two preceding chapters have emphasised, there are enormous differences in wage and interest rates between firms of different size. Factor markets in LDCs are segmented; government policies, especially towards the banking sector, have contributed to these differentials. Yet Pack, Karanshawy and ECLA assume that wage rates are the same for all techniques. This error is the most serious in Karanshawy's study, which includes both power and hand loom firms. Indeed, wages are assumed to be identical even to the extent of imputing the cost of government social security payments to hand loom weavers (Karanshawy, 1975:430-435). In general, the studies which incorporate different factor prices between techniques are those in which the author is thoroughly familiar with the industry and the institutional setting. Choice of technique studies, particularly those considering a wide range of techniques, must incorporate realistic factor prices for all techniques.

Nevertheless, the effect of the omission should not be underrated. This is especially so in the case of the ECLA study, where it is explicitly pointed out (United Nations, 1966:15) that the most modern technique (technique C) is assumed to have sophisticated auxiliary equipment (air conditioners, etc), whereas the least sophisticated (technique A) does not. The use of such auxiliary equipment results in a higher quality product (and hence higher selling price and value added per metre), quite apart from the quality differences which result from the use of more modern looms.

In fairness to Sen, he does recognise that the assumption is doubtful, and dwells on the likely reasons for variations in value added per metre by technique at some length (Sen, 1968:104).
In addition to these general shortcomings, specific limitations apply to several of the studies. Karanshawy, for example, deals with a special good, better suited to hand looms or simple power looms, hence his results cannot be generalised for the weaving industry as a whole. Sen uses as the criteria of economic performance capital-output and capital-surplus ratios. Yet, as the following section will demonstrate, these are of limited use in an economic comparison of different techniques. Given these limitations and the fact that value added is assumed (incorrectly) to be invariant to the technique of production, the conclusion of Sen and Karanshawy that hand looms are the most efficient technique in the weaving industry must be seriously questioned. Several of the assumptions in Pack's study are also doubtful. These include the (implicit) assertions that running costs and the economic life of used machinery are similar to those of new machines. Moreover, some of the values assumed for particular variables are not realistic.5

To conclude, previous choice of technique studies in weaving provide useful insights into the industry. The conclusion that a shift to more labour-intensive techniques is socially desirable is in accord with our conclusions in Chapters Nine and Ten. Nevertheless, we have considerable reservations about the methodology and assumptions of some of these studies.

8.3 The Capital-Output Ratio and its Limitations

Many studies of industrial development in LDCs have used the capital-output (K/0) ratio as a means of comparing the

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5 For example, at one stage the price of used machines is assumed to be 10 percent of a new one. This might be valid ex-factory (that is, from the mill in the developed country which is selling the loom), but is most unlikely to be so for the final price after shipping, port and domestic distribution costs are included.
economic performance of different techniques in a given industry. The K/0 ratio was much used in the debate in India during the 1950s and 1960s regarding the industrialisation strategy to be pursued. In particular, it was adopted as the criterion for deciding whether to promote large or small industry. Advocates of the use of the ratio argued that the aim of economic development should be to maximise output with respect to scarce resources, and that in LDCs the scarcest resource is capital. Thus, it was argued, techniques should be chosen which produce the most output for a unit of capital, that is, the K/0 ratio should be minimised. For our purposes however, the ratio is most inadequate. The purpose of this section is to discuss the limitations of the K/0 ratio and to explain why we do not use it.

The main theoretical objection to the use of the K/0 ratio as a criterion of economic performance is that it considers only one input, capital. By maximising output solely with respect to capital it ignores labour, and in effect treats it as a 'free good'. This proposition can be demonstrated diagrammatically by considering an isoquant, which represents combinations of capital and labour inputs required to produce a given unit of output. Assume a given stock of capital, OC₁, is available (see Figure 8.1). If the aim is to maximise output with respect to this capital stock, output will be represented by the isoquant farthest from the origin (shown here as isoquant Z). When the iso-cost line C₁P is tangential to the isoquant (which it must be for the isoquant to be farthest from the origin), C₁P is horizontal. A horizontal iso-cost line implies that the cost of labour is zero.

6 Important contributions to the debate were those by Dhar and Lydall (1961), Mehta (1969) and Sandesara (1966, 1969). Morawetz (1974:525-526) provides a brief summary of the findings from India and other LDCs.

7 Strictly speaking, factor prices in a Cobb-Douglas production function (which the isoquant purports to represent) are always positive, so a horizontal iso-cost line is the limiting case if large amounts of capital are applied.
hence maximising the output-capital ratio is equivalent to assuming a zero price for labour. Yet such an assumption, whether using market or social prices, is untenable, as the large body of literature on disguised unemployment has demonstrated.

Somewhat surprisingly, this theoretical objection to the use of the K/O ratio has largely been ignored in the industry case studies. Some economists have argued that the most modern techniques are the most 'efficient', in the sense that they minimise capital requirements per unit of output. The confusion regarding the interpretation of the ratio is reflected for example in the following statement by a leading practitioner in the field of development economics, Professor Kaldor:

> If you want to achieve the quickest rate of economic growth, which means maximising output per head of population, you should therefore invest scarce capital in advanced techniques, not waste it on inefficient ones. In other words, methods of production with the best capital-output ratio give the most economical use of capital which you most need when you are short of it (quoted in Robinson, 1965:28) (emphasis mine).

Clearly, 'advanced techniques' do not necessarily have the 'best' (i.e. lowest) capital-output ratio.
Much of the empirical evidence regarding K/O ratios is conflicting. Different studies of the same industry in the same country have produced different results. There are statistical reasons for this conflicting empirical evidence. Most studies use only secondary data (an industrial census or survey), and these usually exclude working capital and measure fixed capital at book value (some even use a less reliable proxy for capital - electricity consumption). The exclusion of working capital introduces a downward bias in K/O ratio for labour-intensive firms, that is, it improves their economic performance. This is because working capital constitutes a relatively higher percentage of total capital for these firms as compared with capital-intensive firms. The measurement of fixed capital at book value introduces a downward bias in the K/O ratio for old established firms as compared to newer ones because the book value of capital will be an underestimate of the market value during a period of inflation. The use of electricity (or energy) consumption as a proxy for capital is unsatisfactory because modern techniques are generally more 'energy efficient'. Other definitional problems arise in using the K/O ratio based on calculations from secondary data. These include whether to use the net or gross K/O ratio, and the marginal or average figure (these limitations are discussed in detail by Myrdal, 1968:1968 ff).

Thus, studies which use the K/O ratio to compare the economic performance of different techniques are unsatisfactory for two reasons. First, many do not have reliable capital data. Secondly, even if this data were available, the ratio is not an adequate guide to economic performance. Comparing a range of technically efficient techniques on an isoquant, choosing a technique which minimises the K/O ratio means that the most labour-intensive technique will always be selected. By definition, this is the technique which requires the least amount of capital to produce a given output, because it uses the most labour.
8.4 Choice of Technique - the Neo-classical Approach

8.4.1 A Theoretical Overview

The standard neo-classical analysis of choice of technique (eg. Ferguson, 1972:109-192) employs an isoquant, which is the locus of all combinations of labour and capital inputs which produce an equal volume of output. In Figure 8.2 this is represented by the curve XX', with the vertical axis (C) representing units of capital and the horizontal axis (L) units of labour. The slope of a ray from the origin to a particular point on the isoquant represents the capital-labour ratio of the technique corresponding to that point. For example, at point P, OC₁ units of capital are used and OL₁ units of labour, and the capital-labour ratio (or the slope of OP), is given by OC₁. Movements along the isoquant are associated with changes in the capital-labour ratio, such that at point P more capital and less labour are used per unit of output than at point Q. Correspondingly, the slope of the ray OP is steeper than that of OQ. In the abstract textbook form, the isoquant is a continuous curve, implying the existence of a continuous
spectrum of techniques available to produce a given volume of output. Hence there is infinite substitutability between the factors of production.

For a given isoquant, the technique chosen by profit-maximising investors will be determined by the slope of the iso-cost line, which represents the combinations of labour and capital that can be obtained for a given outlay. The slope of this line is determined by the ratio of input prices - the steeper the line the lower the price of capital compared to that of labour. In a perfect neo-classical world, the technique chosen will be the one which minimises costs for a given level of output (or maximises output for a given supply of inputs), this technique being the one at which the iso-cost line is tangential to the isoquant. Here the marginal rate of technical substitution, given by the slope of the tangent to the isoquant (whose value is equal to \(-\frac{dC}{dL}\)), equals the slope of the iso-cost line (given by \(-\frac{OC}{OL}\)). Thus in a 'cheap' capital and 'dear' labour environment denoted by the iso-cost line AB, technique P will be chosen, whilst in the reverse situation (denoted by the line DE) technique Q will be selected.

Specification of the isoquant and iso-cost line enables the usual distinction between technical and economic efficiency to be made. A technique is technically inefficient if it uses more of one input and no less of another input to produce a given level of output. Thus in Figure 8.2 any technique located north-east of the isoquant XX' and producing the same level of output is technically inefficient as compared to a corresponding point on the isoquant. Clearly, technical efficiency and the level of labour productivity are not necessarily related. Points on the extreme right of the isoquant represent low labour productivity techniques, since they require much labour to produce a given volume of output. However, because these
techniques use less capital per unit of output than those to the left, they are not technically inefficient.  

Technical efficiency is concerned with the physical characteristics of each technique, of how much labour and capital are required per unit of output. However, no consideration is given to the price of these inputs. By contrast, economic (or allocative) efficiency is defined as the technique which minimises the cost of producing a given level of output, and is shown by the tangency of the iso-cost line to the isoquant. It follows that techniques which are economically efficient must be technically efficient (providing factor prices are positive), but the reverse does not necessarily apply. In Figure 8.2, if AB is assumed to be the price ratio which all investors face, then all points on the isoquant XX' other than P, whilst technically efficient, are economically inefficient.

8.4.2 Modifications of the Textbook Version

Essentially, this abstract textbook version assumes perfectly competitive product and factor markets, the existence of an infinite number of technologies and homogeneous products, and a world in which investors are influenced solely by two prices - those of labour (the wage rate) and capital (the interest rate). In order to transform the textbook version into a workable tool of analysis, two modifications are necessary. These are:

(i) Dropping the assumption of an infinite range of techniques of production. Clearly, no products exist for which the factors of production are infinitely substitutable, except perhaps at the 'blue-print' stage.  If instead a discrete

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8 This definition of technical efficiency differs from the engineering definition, which is usually actual output per unit of time as a percentage of potential output.

9 However, one research institute devoting much of its resources to the choice of technique in developing countries, the David Livingstone Institute of Overseas Development
production function is assumed, the isoquant is no longer the smooth continuous curve as in Figure 8.2 but resembles that in Figure 8.3 (for example) where it is assumed that five techniques are available (one at each of the points shown in the diagram). This modification has the effect of generating a range.

Figure 8.3: An Isoquant Representing a Discrete Production Function

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Studies at the University of Strathclyde, has increased the range of techniques available by constructing 'synthetic techniques'. This approach combines the various techniques from each stage of production to generate a large number of 'technologies'. These are synthetic in the sense that, whilst each 'technology' (defined as a combination of techniques of each stage of production) is theoretically possible, in practice it may never have been used (Pickett, 1977).
of factor prices over which any particular technique will be economically efficient. For example, the range of factor prices for which technique R is economically efficient is defined by the slopes of the two iso-cost lines QQ' and SS'. In the case of the continuous isoquant, however, there is only one iso-cost line which is tangential to any given point on the isoquant.

(ii) Dropping the assumption of homogeneous products and equal factor prices. The assumption that goods produced by different techniques are homogeneous and have the same selling price, whilst frequently made (see section 8.2), is untenable. Similarly, the assumption of equal input prices is unrealistic. Explicit allowances must be made for pecuniary economies of scale, that large capital-intensive firms will obtain their non-labour input at lower prices. Differences in inputs and output prices between techniques mean that output no longer can be measured in terms of physical units, as in the case of the abstract version, but must be measured in terms of value added. Thus what should be calculated for each technique is capital and labour per unit of value added, rather than per unit of output. Instead of constructing an isoquant we have an 'iso-value added'.

In the simple textbook version the slope of the iso-cost line is given by $\frac{w}{r}$ (where w and r are the unit prices of labour and capital respectively). For our purposes this is inadequate because it is 'timeless', in that capital is paid for in year 0 and yet wages are paid over the period for which the machinery is in operation. In order to compare capital costs which are incurred in the current period with a stream of annual wage payments n years into the future (n = number of years over which wages are paid, corresponding to the working life of fixed capital), the annuity formula must be used:
either annual wage payments must be capitalised into a 'life-time' wage, equivalent to the present value of a series of annual wages paid n years into the future, or capital costs must be annualised. The former method is adopted here, although the result is the same regardless of which is used. 10 The annuity formula is derived as follows:

let \( W \) = annual wage
\( r \) = rate of interest (and discount rate)
\( n \) = the working life of the fixed capital (in years)
\( Q \) = present value of wages

then
\[
Q = W + \frac{W}{1+r} + \frac{W}{(1+r)^2} + \cdots + \frac{W}{(1+r)^n}
\]

It can be shown that the present value of annual wages paid for \( n \) years (\( Q \)) is equivalent to the slope of the iso-cost line once the time dimension is introduced into the analysis (for a proof of this, see Appendix 8.1). Thus the 'life-time' wage for one worker represents the value on the vertical axis (capital) for one unit of labour. 11

8.5 Limitations and Objections to the Neo-classical Approach
The following two chapters will employ the neo-classical approach in analysing the choice of technique in the weaving industry, based on the modifications discussed in the previous section. It is important to recognise, however, that some

10 This was in fact tested in our calculations and the results were identical.
11 That is, if the equation is of the form \( Y = a + bX \), where \( Y \) = value of capital and \( X \) = units of labour, then for one unit of labour, the equation intersects the vertical axis at \( bX \). Since \( X = 1 \), \( bX \) is equivalent to the life-time wage of one worker.
economists argue that these tools of analysis are of little value in investigating the choice of technique in LDCs. For example, Stewart (1978:275) maintains:

Neo-classicists have always emphasised relative prices as being of critical significance. But the analysis of technical choice made here suggests a much more complicated process, with relative prices being just one of the selection mechanisms, often of only minor significance.

Numerous other studies argue that relative factor prices are not important in the choice of technique (eg. Cooper et al., 1975:117).

The textbook version is of necessity a highly simplified approach which cannot easily be adapted to the real world, and ultimately its merits can be assessed only on an industry and country-specific basis. The purpose of this section is to consider some of the limitations and objections to the neo-classical approach, with reference to the Indonesian weaving industry. It will be argued that none of the issues raised is sufficiently serious to invalidate this approach.

8.5.1 Do Alternative Techniques Exist?

One reason for the absence of a significant debate on the choice of technique in LDCs before the 1970s was a widespread belief that the range of technically efficient techniques in most manufacturing industries was very small. This view was first popularised by Eckaus (1955) who argued that for many sectors of the economy few alternative techniques existed, and those available were generally capital-intensive. Higgins (1968:Chapter 14) later developed his theory of technological dualism on the basis of this argument.

According to this 'technological determinist' view, the process of production is restricted to one technique in many industries owing to the existence of rigid technical coefficients, or at least because investors perceive this to be the case. This gives rise to an L-shaped isoquant (shown
here as YY') where the elasticity of substitution between labour and capital is zero, that is, labour and capital inputs must be combined in fixed proportions (Figure 8.4). It follows that relative factor prices are irrelevant in this model, because the technique chosen is insensitive to the slope of the iso-cost line (eg. whether it is AB or DE).

The theory is applicable to some industries, where the range of technically efficient techniques is very limited (eg. oil drilling and refining, petrochemicals). However, it is open to three main criticisms. First, increasing empirical research indicates a range of techniques does exist in most industries. Secondly, a distinction should be made between the core process of production and peripheral activities. Even if the range of techniques is limited in the former, for many other activities (eg. packaging, transport) flexible factor proportions may exist. Thirdly, the scope for 'capital-
stretching', by intensive use of machinery and sub-contracting wherever possible, is very considerable. Hence, even if the range of techniques is limited, the capital-labour ratio is not (these points were discussed in more detail in Chapter Two above).

In fact, in the case of the Indonesian weaving industry a wide range of techniques and firms of differing size exist, as was pointed out in Chapter Four (section 4.3). At least six distinct types of weaving looms are in use in Indonesia (plus numerous on-site technical adaptations in many factories), making it one of the most technologically diverse industries in the world. Looms from textile machinery manufacturers in at least 10 countries - including several LDCs (eg. India, South Korea, Taiwan, China and Indonesia) - can be found. For some industries, it is argued, because the available technology is produced only in developed countries, which face very different relative factor prices, none of the technology is suitable for LDCs. Clearly, this is not the case in weaving, owing to the presence of several LDC machinery makers and a thriving international used machinery market.

8.5.2 Economies of Scale

The influence of economies of scale can be demonstrated using a simple diagram. Suppose there are two techniques, one labour-intensive ($T_L$) and the other capital-intensive ($T_C$), and that their long-run average cost curves are as in Figure 8.5. Here the level of output determines which is the lowest cost technique: if output is less than $A$, $T_L$ produces at lower cost, but beyond $A$, $T_C$ is the cheaper technique. In the simplest neo-classical approach to the choice of technology, the fact that the importance of economies of scale differs between techniques is not usually considered. However, different techniques are not equally divisible. Not surprisingly, economies of scale are usually more important in capital-intensive processes because larger machines are less divisible and are designed for large markets (White, 1978:35-36 provides a succinct summary of the issues).
Many choice of technique studies have concluded that scale is the most critical variable in determining which is the lowest cost technique. As would be expected, most capital-intensive techniques at low levels of capacity utilisation are not competitive with traditional labour-intensive techniques.\textsuperscript{12} It is significant that many of the studies which reach this conclusion refer to relatively small African economies which have high barriers to international (and, in some cases, domestic) trade. Indeed, in their three country study into can making, Cooper et al. (1975:110) concluded that the lowest cost technique in Kenya was more capital-intensive than that for the neighbouring country of Tanzania, which has a smaller domestic market.

\textsuperscript{12} This is the conclusion of several studies in the special issue of World Development, 5 (9 & 10), 1977, devoted to the choice of technology in developing countries.
In the case of the Indonesian weaving industry, scale is not an important constraining factor. In Chapter Four (section 4.7) it was observed that economies of scale are not of great importance in the textile industry compared to most other manufacturing industries, and within textiles are less for weaving than fibre-making, spinning or finishing. Moreover, by LDC standards Indonesia has a large (and highly protected) domestic market for cloth. Also it is not segmented geographically because most textile consumers are in Java or relatively accessible regions of the Outer Islands. (We also noted in Chapter Four that most backstrap weaving is carried out in the more remote areas of these islands.) Finally, yarn, diesel oil, spare parts and the foreign exchange necessary to purchase these inputs are generally in plentiful supply, in contrast to the period before 1966 when the majority of firms could operate one or at most two shifts per day. Thus, to the extent there are impediments to exploiting economies of scale in the industry, they are more the result of managerial inefficiency than the size of the market or the supply of inputs.

8.5.3 Product Quality and Technology

Several views exist regarding the relationship between product quality and technology in LDCs. We saw above that many choice of technique studies make the doubtful assumption that product quality is the same, whatever technique is used. At the other extreme are writers who maintain that quality differences between techniques are generally so substantial that it is misleading to treat the products as the same good.

13 By the late 1970s Indonesia's domestic market for cloth was over 1 billion metres. By contrast, the market in many smaller African countries is around 50 million metres or less, and highly segmented. 50 million metres is the output of little more than two large mills operating close to full capacity.

14 Other economists argue that whilst there are quality differences, they are not great. For example, in his six industry case study in Indonesia, Wells (1973b:64) concluded that 'in most industries, high quality products were produced in intermediate technology plants as well as capital-intensive ones'. However, in another article on the
Mechanised techniques, it is argued, produce higher quality products which are also of more even quality, or at least consumers believe this to be so. (By contrast, the attraction of hand produced goods is often their uneven quality.) The question at issue, it is asserted, is not the choice of technique in producing a given product, but the choice of product. For example, Stewart (1972:114) argued:

> The conventional distinction between choice of product and choice of technique (or choice of process) is an arbitrary one. If product requirements are sufficiently finely specified, only one process may be possible.

The consumer demand theory developed by Lancaster (1966) is invoked to support this argument; that is, products can be decomposed into bundles of quality characteristics which define the 'product'.

Stewart bases her approach on two case studies conducted in Kenya into brick manufacture and maize grinding, both industries which exhibit a wide range of techniques in use. In the former industry, low quality hand made bricks and the kiln-fired mass produced product both satisfy the need for 'shelter'. However, if bricks for a multi-storey building are required, considerations of strength, consistency and quality rule out the hand made product. Similarly, in the maize grinding industry, the products of different techniques cater for different segments of the market. The traditional methods produce a relatively unprocessed maize flour, whilst the modern techniques produce a highly refined and packaged maize meal - the taste and appearance of which bear little resemblance to the traditional product - almost exclusively for urban consumers.

If the argument that different techniques produce goods of such different quality that they cannot be regarded as the same subject (Wells, 1973a:331), it is revealed that the price of goods produced using capital-intensive techniques was between 30 and 100 percent higher than that of the intermediate technology goods.
good is correct, then many of the assumptions underpinning choice of technique analysis are no longer relevant. The choice of technique analysis involves the calculation of 'boundary' or 'switching' prices beyond which different techniques would be competitive. However, if the elasticity of substitution between the goods is low, a lowering of the price of labour-intensive goods relative to capital-intensive goods may not result in any substantial increase in demand for the labour-intensive good.

A final point to note is that quality is just one - albeit the major - factor explaining differences in value added per unit of output. Another factor which has been found in a number of case studies is that capital-intensive techniques involve less raw material waste or produce fewer rejects, so the amount of value added produced from a given physical quantity of inputs is greater. Particularly in the case of raw material wastage however, these findings are more applicable to industries processing agricultural products, such as rice-milling and sugar-processing (for a summary, see Bhalla, 1975:312). Moreover, in low wage, labour-intensive activities, considerable scope exists for reprocessing raw material waste, so the loss may be less.

Clearly, the force of these arguments varies between industries and thus it is only possible to discuss their importance within a particular industry. It has already been pointed out that quality differences between techniques are less in the weaving industry than in almost any other major manufacturing industry in LDCs and that in the Indonesian industry there has been less product specialisation according to technique than in most other LDC weaving industries. Hence the 'quality' argument is not of major importance for weaving, nor is there any evidence to suggest raw material wastage differs between techniques. Nevertheless, many different types of cloth are produced and quality differences are present to some degree. To overcome these problems in our analysis, the
economic performance of the techniques is compared by
calculating value added per metre for the same type of cloth.  

The issue of product quality and technique is complicated
by the fact that it is not always clear whether observed
quality differences are due to technique per se or to other
factors. For example, fully-automatic mechanised looms
(technique M₃) produce cloth of higher quality than hand looms
(technique H). However, this is attributable in part to factors
other than the techniques themselves: the hand loom firms may
use inferior quality yarn; less attention is given to quality
control in these firms; the modern plants are air-conditioned
or at least humidified, which results in less yarn breakage
and thus higher quality cloth; poorer quality parts are used by
smaller firms. Quality differences would exist even in the
absence of these factors, but they do contribute to the
difference.

8.5.4 The Goals of Investors

Neo-classical analysis has been criticised for its
assumption of profit maximisation, that is, for assuming that
investors are aware of alternative techniques, that they
calculate the costs and benefits of each, and that they pursue
a policy of profit maximisation. The validity of this
assumption for western economies has been the subject of
extensive debate (eg. see the review by Scherer, 1973:27-36).

Two main conclusions emerge from the debate for our purposes.
First, market structure is important in determining the behaviour
of firms. In a competitive market environment without subsidies,

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15 There is little point in comparing the performance of large
and small firms in the same industry if they produce
different types of goods. (For example if large firms
produced only plain cloth and small firms patterned cloth.)
This is another weakness of the studies using capital-output
ratios from secondary data (see section 8.3 above).

16 For example, small firms usually buy inferior quality
domestically made shuttles, or second-hand shuttles
discarded by the larger firms.
firms which do not maximise profits will eventually be weeded out. Secondly, the concept of 'bounded rationality' is a useful modification of the profit maximisation assumption. Businessmen cannot be seen as omniscient maximisers, but instead maximise on the basis of available information. There are costs involved in obtaining extra information which may exceed the benefits derived from utilising this superior knowledge. (The concept of 'bounded rationality' was invoked by Garnaut (1972:171-178) to explain trade patterns between Australia and Southeast Asia.)

Whether investors in LDCs are 'economic-minded' and pursue the goal of profit maximisation is also the subject of much debate. In LDCs, it is argued, the range of entrepreneurial groups and the techniques they employ is wider, hence there is likely to be a greater diversity of objectives. These countries are in a state of transition from traditional society to a modern industrial economy, and vestiges of a bygone technological epoch and mode of commercial organisation still remain. In the words of Ranis (1978:9-10):

Traditional economic analysis considers technology as a strictly economic issue, that is, within the calculus of the efficiency of resource allocation, factor price distortions, competitive v/s non-competitive behaviour, etc. within a particular epoch ... the issue of technology choice and change within a developing country, however, is basically an issue within a system in transition from agrarianism to modern growth.

Several other arguments are advanced to support the view that relative factor price may not be important in determining the selection of industrial technology in LDCs (or developed countries for that matter). First, there is the issue of prestige: businessmen may adopt the latest machinery not because it is the least-cost technique but because of the status it confers upon the owners. The second relates to the so-called 'engineering man'. According to this view, the most influential group in the selection of technology is engineers, who have a tendency to seek to maximise labour productivity,
with little regard for differences in relative factor prices between developing and developed countries. This behaviour is said to result from their training in developed countries, or at least a greater familiarity with western technology. They may also prefer modern technology, it is argued, because of 'engineer's aesthetics' and the desire to produce the highest quality good possible.¹⁷

Thirdly, labour force issues are frequently cited as affecting the choice of technique in developing countries. Labour-intensive techniques introduce problems of supervision, co-ordination, organisation and quality control not present in the same degree for capital-intensive techniques. Managers, in their desire for a 'quiet life', may prefer to adopt a more capital-intensive technique even if it is not economically efficient. Another view, running counter to this, maintains that in pre-capitalist economies (or those which have recently moved out of this stage of development), employers of labour are under strong social obligations to create work (or share income) and hence are constrained from adopting more capital-intensive techniques.

The most important point to note in relation to these arguments is that many factors which are described as 'non-economic' considerations may in fact reduce to an economic issue: purchasing the most modern machinery may only be for reasons of prestige, but alternatively it may enhance the brand name of a firm's product; producing the highest quality goods

¹⁷ These arguments are developed by Wells (1973a, 1973b). Other writers go further and attribute the selection of inappropriate technology to insufficient cooperation between economists and engineers. For example, in discussing why excessively capital-intensive techniques (even at market prices) were chosen in a two industry case study in Africa, Pickett et al. (1974:51) conclude that "the explanation of imprudent decision lies in the malign influence of the engineer and the conceit of the economists." The reason, they assert, is that engineers take insufficient account of relative factor prices, and economists have paid too much attention to highly aggregated and abstract models of development.
may be profitable; and the costs associated with supervising and managing a large semi-skilled labour force are considerable.

How relevant are these arguments to the Indonesian weaving industry? The dichotomy between 'engineering man' and 'economic man' would apply only to firms large enough to require such a division of responsibilities. In Indonesia this would refer only to the largest of the firms in the modern sector. The relative unimportance of prestige in the weaving industry can be seen from the very small number of shuttleless looms in use.

All industry sources maintain they are uneconomic at the present range of prices. (No firms in our sample had these looms, so it is not possible to test this.) To our knowledge, no foreign firms possess shuttleless looms, but a small number of domestic firms have a few in use.

There are several aspects to the problem of organising a large labour force and these are often not appreciated by the advocates of labour-intensive techniques. First, government labour regulations in LDCs may make it difficult for firms to dismiss labour, hence employers may seek to minimise their workforce. Secondly, fear of labour unrest and trade union activity may discourage them from taking on labour. However, these factors apply with less force to Indonesia than many other LDCs: trade unions are weak and government-controlled, regulations regarding the dismissal of workers and shift work do not present major problems to most firms (see Chapter Five).

Third, there are the problems of supervision and coordination of the labour force, especially if there are several stages of production. Problems of absenteeism and theft arise; a wage system must be devised which acts as an incentive to increase output but which ensures quality is maintained; if output is seasonal - often the case for labour-intensive activities - there are recruitment problems. These difficulties are of some importance in weaving, but are probably less than is
the case in many other industries.\textsuperscript{18} Several larger and more progressive handloom weavers who were in a position to contemplate switching to mechanised weaving mentioned labour problems in our interviews.\textsuperscript{19}

There is little evidence to suggest that social pressures to adopt labour-intensive technology are important in the Indonesian weaving industry. Sentiments about the importance of employment creation are frequently expressed in the textile co-operatives. The GKBI mill in Yogyakarta - one of the largest and most modern in Indonesia - has recently been criticised for purchasing 500 fully-automatic looms. One of the medium koperasi mills deliberately chose semi-automatic looms, even though fully-automatic looms were available, in order to create more jobs. But such behaviour elsewhere in the industry is very rare. Even state enterprises are officially supposed to be run on strict commercial principles. Their overstaffing is more likely to be the result of managerial inefficiency than conscious policy decisions.

In summary, then, there are no reasons to presume that profit maximisation is a less important goal and that non-economic issues are a more important consideration in the Indonesian weaving industry than in any other LDC manufacturing industry. Ultimately, the importance of profit maximisation as an objective of investors depends on the structure of the industry. Owing to the competitive nature of the weaving industry in Indonesia, there is strong pressure on firms to minimise costs (see section 8.5.7 below).

\textsuperscript{18} See, for example, an evaluation of their importance in the World Bank study into choice of technique in road construction (Sud et al. 1977:55-60).

\textsuperscript{19} One respondent, the largest weaver in Pedan, specifically cited this issue as the reason for his intended purchase of power looms. He claimed that for a given output of cloth hand looms were at least as profitable as power looms, but that labour problems were unimaginable (tidak dapat dibayangkan). However this is not entirely unambiguous evidence that the labour problem is a non-economic issue. The weaver is also a textile trader. The smaller labour force if power looms were purchased would enable him to expand his trading activities.
8.5.5 Uncertainty and Changes in Factor Prices

The simple neo-classical analysis of choice of technique is static in nature. It considers only current factor prices and machine productivity, and does not take into account possible future price changes, nor the likelihood of disembodied technical progress. If, for example, investors anticipate an increase in the price of one factor relative to the other, it would be rational for them to take this into account in choosing a technique. Moreover capital equipment may be uneconomic at current levels of demand, but could become feasible as the market expands. As Perkins et al. (1977:61) argue in discussing rural small-scale industry in China: 'A static picture of technical and allocative decision may look "wrong" relative to the immediate technical and price environment, but could be "right in the long run".' This limitation too, is probably relatively unimportant in Indonesia. The factor most often cited - that of a sudden 'wage explosion' - is unlikely to occur. 20 Trade unions lack real power and, whilst events in developing countries can rarely be predicted with certainty, there seems to be little prospect of a period of political instability which might usher in a series of rapid wage increases.

Other explanations as to why firms may not adopt the least-cost technology also invoke risk and uncertainty. Wells (1973a:331-334) maintains that more capital-intensive plants offer two kinds of insurance. First, they allow managers to

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20 Although the argument is still employed by western textile machinery sellers in Indonesia as a reason for adopting capital-intensive technology. The author unwittingly became involved in a discussion of this issue in a Central Javanese town when a German saleswoman was staying at the same hotel. The head of the sizing division of a local textile mill, who could speak little English and no German, visited the salesman. With the author acting as interpreter, the salesman described in graphic detail how wages had doubled in one year in Portugal after the political changes, and that it 'could happen here too'. The Indonesian was not impressed by the argument.
respond more quickly to sudden fluctuations in demand, whereas labour-intensive plants are less flexible: if demand increases, extra labour must be recruited and trained; if it falls it may be expensive and difficult to dismiss workers (this is a similar argument to that in the previous section). Secondly, the construction of capital-intensive plants may reduce the risks of facing future liquidity crises, if the capital market is imperfect and the firm is in a short run monopoly position. Contrary to these arguments, of course, it could be argued that risk and uncertainty discourage entrepreneurs from investing in large, capital-intensive plants. In a period of political uncertainty, for example, their time horizon will be short and they will discount future income streams very heavily. The Chinese business community in Indonesia frequently is characterised as behaving in this manner (see Chapter Nine).

Nevertheless, these limitations apply only for the simplest neo-classical formulation of choice of technique models. An extensive literature has developed regarding the incorporation of risk and uncertainty into models of economic behaviour (see, for example, Tisdell, 1968).

8.5.6 The Political Economy of Choice of Technique

Stewart and other development economists also criticise the neo-classical approach for its alleged failure to consider the 'political economy' dimensions of the decision-making process. For example, she maintains:

The system of prices cannot be treated as an independent parameter, which may be altered at a stroke .... Prices ... are themselves the consequence of a particular production structure, arising from technology and historical developments in the society in question (Stewart, 1974:105).

And in another context:

The situation is technologically determined not because there is no alternative technology to choose from but because of the complex links between the selection mechanisms and the techniques chosen, which
make the choice of an alternative system extremely difficult (Stewart, 1978:279).

The essence of the argument is that the political structure of most LDCs is such as to preclude the adoption of appropriate technology. For example, relative factor prices are distorted precisely because such a situation benefits powerful vested interest groups: credit is cheap because large investors are politically influential; exchange rates are overvalued partly because the resultant need for import licensing confers monopoly profits on well connected licence-holders. Market prices depend on the pattern of income distribution to some extent. A more equal distribution of income would, it is argued, increase the demand for goods produced by labour-intensive techniques, because such goods usually cater for low income consumers. Indeed, it is maintained that the causation between technology and prices runs both ways, because the adoption of a certain technology affects income distribution and the labour market. Little research is undertaken into alternative technology because a strong alliance is forged between the 'compradore' domestic business community and foreign investors in many LDCs, which encourages the importation of western technology.

There is much to sympathise with in these arguments, and our discussion in the concluding chapter will emphasise that many of the policy reforms which may be desirable in principle are not politically feasible options. However, this does not invalidate the methodology of the neo-classical approach. Such analysis can be employed to indicate the economic implications of policy changes; whether in fact such changes can be implemented is another question.

8.5.7 The Influence of Market Structure

Market structure is perhaps the most important factor in deciding whether the neo-classical model is appropriate and whether relative factor prices are a major determinant in the selection of industrial technology. In industries where competitive pressures are not great, firms are not compelled to
seek out and adopt the lowest-cost technique, and consequently there is more scope for the fulfilment of 'non-economic' goals - the desire for a 'quiet life' (a smaller labour force with a more capital-intensive technique), the use of the most modern machinery available (prestige), or the production of goods whose quality is excessively high for the need or effective demand of consumers in developing countries (engineering man). There is considerable evidence of the relationship between the choice of technique and market structure in developing countries. For example, Wells (1973b: 65) in his study of Indonesian industry concluded:

The choice of technique appears to be most closely related to the competitive position of the firm. In cases where the firm competed primarily on brand image rather than price, the plant tended to be relatively capital-intensive. Where price was the basis of competition, the pressures to reduce costs to a minimum drove the firm to a more labour-intensive technology.

Similar conclusions are reached by Ranis (1978:34-35) and Bhalla (1975:316-318) in his summing up of several ILO case studies.

In Chapter Four (section 4.7) it was argued that the structure of the Indonesian weaving industry is such that competitive pressures are very strong, within the protected domestic market. To recapitulate, the major reasons for this are, first, the low concentration ratios for buyers and sellers; second, the relative unimportance of technical economies of scale; third, the lack of product differentiation for similar types of cloth; and fourth, substantial but not pervasive government influence in the industry regarding barriers to competition. Those products for which the market is oligopolistic or oligopsonistic (eg. the production of very high quality grey cloth for batik (primissima), or certain types of woven canvas goods respectively) constitute only a small fraction of total textile output.
Empirical support for the conclusion that competitive pressures compel weaving firms to be cost minimisers is derived from a nine-industry case study in Indonesia by Keddie (1975). The aim of the study was to test the hypothesis that, rather than seeking to minimise costs, for a variety of reasons the primary aim of firms is to secure an 'objective product advantage'. On the basis of interviews with management in each of the industries, Keddie concluded that in weaving the emphasis is on 'economy' and that it constitutes an exception to the normal pattern. Of the nine industries he concluded that:

Neither the printing industry nor the weaving industry provides much strong support for the [objective product advantage] hypothesis .... In weaving there is considerable support for cost minimising behaviour (Keddie, 1975:136).

A recent study of the Thai textile industry by Santikarn (1977) adds weight to our conclusion that the neo-classical approach provides a useful analytical tool in which to examine the choice of technique in the Indonesian weaving industry (the structure of the Thai and Indonesian weaving industries are broadly similar). On the basis of her discussions with mill managers she concluded that:

The major impression that emerged from the interviews is that, subject to some qualifications, the relative factor price thesis can be modified to explain the choice of technology in the Thai textile industry (Santikarn, 1977:296).

8.6 Conclusion

The aim of this chapter has been to establish a methodological framework in which to conduct the choice of technique analysis in the next two chapters. Several important conclusions have emerged. First, it is quite inappropriate to use the capital-output ratio - as some studies have done - to compare the economic performance of different techniques in a given industry.
Secondly, previous choice of technique studies in the weaving industry in LDCs were reviewed. Interesting as their methodology is, it was argued that lack of attention to detail greatly limits the usefulness of some of these studies. If choice of technique studies are to have meaningful policy implications, it is essential that the economic and technical parameters accurately reflect real world conditions. Product quality does vary between techniques; firms employing different techniques do face different wage/interest ratios; the performance of techniques does differ between countries, especially between developed and developing countries.

Thirdly, we discussed in considerable detail modifications required to transform the textbook neo-classical approach into a workable tool of analysis, and considered more general objections to the neo-classical approach. Despite much criticism of the approach it was concluded that, for the Indonesian weaving industry, relative factor prices are the single most important determinant of the choice of technology. This conclusion has important ramifications for our discussion of policy reforms in Chapter Eleven. 'Getting prices right' is the key to the adoption of appropriate technology in the industry.
APPENDIX 8.1

THE SLOPE OF THE ISO-COST LINE

The purpose of this appendix is to demonstrate that the present value of a series of annual wages \( W \) paid over \( n \) years and discounted at a rate \( r \) (which is equal to \( W \left( \frac{1}{r} \frac{1}{(1+r)^n} \right) \)) is equivalent to the slope of the iso-cost line.

The cost of production, \( C \), can be defined as

\[
C = kK + wL
\]

where \( kK \) is the cost of capital and \( wL \) the cost of labour.

According to the textbook version, the slope of the iso-cost line is \( w \). The annual cost of capital (\( C_k \)) consists of the interest cost plus depreciation, hence

\[
C_k = (r + \delta)K
\]

What is \( \delta \), the depreciation cost?

Using the straight-line method of depreciation, \( \delta = \frac{1}{n} \)

However, it is incorrect to put \( \delta = \frac{1}{n} \). The arithmetic sum of the depreciation allowances will equal \( K \), but in fact the effective total will exceed \( K \) because of the effect of compounding. What is required is an amount set aside each year, \( \delta K \), the sum of which equals the present value (current purchase price) of the capital.

Hence,

\[
K = K \left[ \delta(1+r)^{n-1} + \delta(1+r)^{n-2} + \ldots + \delta(1+r) + \delta \right]
\]

\[
1 + r = \delta(1+r)^n + \delta(1+r)^{n-1} + \ldots + \delta(1+r)
\]

\[
1 + r = \delta(1+r) \left[ (1+r)^{n-1} + (1+r)^{n-2} + \ldots + 1 \right]
\]

\[
1 = \delta \left( \frac{(1+r)^n - 1}{r} \right)
\]

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I am grateful to Ross McLeod for discussions about this issue.
\[ \delta = \frac{r}{(1+r)^n - 1} \]

Hence, the annual capital cost, \( C_k \)
\[ = K(r+\delta) = Kr\left(1 + \frac{1}{(1+r)^n - 1}\right) \]
\[ = K\frac{(1+r)^n}{(1+r)^n - 1} \]
\[ = Kr\left[1 - \frac{1}{(1+r)^n}\right] \]

Hence total cost, \( C = Kr\left[1 - \frac{1}{(1+r)^n}\right] + wL \]
and the slope of the iso-cost line = \( \frac{w}{r} \left[1 - \frac{1}{(1+r)^n}\right] \)
which is equivalent to the present value of a series of annual wages.
CHAPTER NINE  
CHOICE OF TECHNIQUE IN THE INDONESIAN WEAVING INDUSTRY

9.1 Introduction
The previous chapter concluded that the neo-classical approach, whilst not universally applicable, provides a workable framework in which to analyse the choice of technique in the Indonesian weaving industry. The purpose of this chapter is to examine the technical and economic efficiency of the four main techniques in the industry in 1977 (hereafter, 'actual' prices refer to those prevailing in 1977). Our aim is two-fold. First, to test whether private, profit-maximising investors are economically rational in adopting the technique they have chosen, given the relative factor prices they face. Secondly, to consider the sensitivity of our findings to changes in wage and interest rates; that is, would the selection of industrial techniques differ if decisions were made on the basis of 'shadow' rather than 'actual' factor prices? The following chapter examines the effects of changes in several policy variables on the competitiveness of the techniques. Chapters Nine and Ten are core chapters because they contain our major conclusions regarding the economic performance of the main techniques in the weaving industry.

The analysis follows the methodology employed by Timmer (1973, 1975), although with considerable modification and additional detail. It might be noted in passing that it is somewhat curious that few other studies have employed the basic tools of micro-economic analysis - isoquants and iso-cost lines - in studying the choice of technology. Several simplifications are necessary in order to conduct the analysis. It should be emphasised that these have little overall bearing on our results. Hence they should not distract us from the more important task of examining the economic performance of the techniques under various policy regimes and for a range of factor prices.
This chapter consists of five main sections. First, there will be an overview of the method of approach to be adopted (section 9.2). Secondly, in section 9.3 we explain how an isoquant is constructed representing the four techniques in the industry. Section 9.4 examines the economic performance of these techniques for actual factor prices, and discusses further the notion of investor 'rationality'. Section 9.5 introduces the concept of shadow prices and considers how their use may alter our conclusions in section 9.4. Finally, we repeat our calculations for a second type of cloth, sarung, in order to test how general our conclusions are for the industry as a whole (section 9.6).

9.2 The Method of Approach

The procedure adopted in this and the following chapter is to construct an isoquant (or 'iso-value added') for each policy regime. The isoquant is defined by four points, each representing the value of capital and number of units of labour required to produce a given value added for the relevant technique. There are five main steps in the construction of the isoquant (these are described in detail in the following section):

(i) The calculation of value added per unit of output for each technique. Owing to differences in selling prices and input prices, it is not possible to conduct the analysis in terms of the physical quantity of output.

(ii) The calculation of annual output per machine for each technique. Capacity utilisation varies between techniques for several reasons.

(iii) The calculation of investment costs for each technique. All fixed and working capital costs are included in our analysis; there are considerable differences not only in loom prices but also other fixed capital (land and buildings) and working capital per machine.
(iv) The estimation of wage rates and labour : machine ratios. There is considerable variation in wages (see Chapter Seven) and labour : machine ratios between techniques.

(v) The calculation of labour and capital requirements for each technique. As output per machine differs between techniques, input quantities are standardised first by calculating labour and capital requirements for the same physical quantity of output. Secondly, because value added per unit of output varies between techniques, the final step is to calculate labour and capital requirements for a given value added.

These steps are all rather laborious. There seems no other satisfactory method of approach however, and it is surprising that numerous other choice of technique studies have not appreciated the importance of attention to detail.

To determine whether a technique is economically efficient an iso-cost line must be specified. As was pointed out in the previous chapter, the slope of this line is given by the present value of a stream of annual wage payments, paid over the economic life of the machine. The higher the ratio of wages to the interest rate, the steeper the slope of the iso-cost line (Figure 9.1). For this reason low interest rates, ceteris paribus, have the effect of rendering the more labour-intensive techniques, which are located on the southeast section of the isoquant, less attractive. This is contrary to what the advocates of cheap credit for small-scale industry might expect. The apparent paradox arises however, because the proponents of small industry implicitly have not considered the existence of alternative techniques. A cheap credit program increases the slope of the iso-cost line and, therefore, the likelihood that this line intersects (rather than is tangential to) the isoquant at the point representing the most labour-intensive technique, in which case the technique no longer is economically efficient.
Thus, there are two main sets of factors which determine the economic performance of the techniques. The first set is that which determine capital and labour requirements for a given value added. This includes the rupiah price of machinery, the intensity with which capital is used, and the amount of value added per unit of output. These factors determine whether each technique is technically efficient. The second

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1 Of the three main policy variables considered below in Chapter Ten - the exchange rate, the imposition of a duty on imported machinery, and lifting the prohibition of the import of used machinery - a change in any one affects the rupiah price of machinery. However, we shall see later that only the third policy definitely affects machine prices, capital usage and value added per metre.
set of factors - the price of labour and the interest rate - determines the slope of the iso-cost line and hence the techniques' economic efficiency. (An additional factor which determines the slope of the line is the economic life of the machine.) It is important that these two sets of influences be kept separate in the analysis.

Presenting the analysis in terms of an isoquant and iso-cost line has several advantages. First, in practice wage and interest rates vary between firms employing different techniques, owing both to the presence of market imperfections and certain institutional factors, and for sound economic reasons (Chapters Six and Seven). Nevertheless, as was pointed out in Chapter Eight, several choice of technique studies in LDCs make the wholly unrealistic assumption that relative factor prices are invariant to the technique of production in use. In our analysis, this assumption can be discarded. Differences in factor prices between techniques can be incorporated by constructing an iso-cost line (or range of lines) of different slope for each technique. A second advantage of the neo-classical approach is that it enables us not only to ascertain whether the techniques are technically efficient, but also to test whether investors are 'rational' in choosing the relevant technique. Using this analysis it is also possible to consider the effects of alternative policies on the competitiveness of the techniques.

Before proceeding with the analysis, several additional points should be made. First, as a simplification, only the weaving stage of production will be considered. In fact, 'weaving' is a term which encompasses a series of preparation stages, weaving itself and, sometimes, finishing (see Glossary

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2 We are defining investor rationality in the restricted sense that an entrepreneur chooses that technique which minimizes the cost of production for a given combination of factor prices. Nevertheless, there is some debate regarding the time horizon of profit-maximising investors in LDCs. This issue is taken up in section 9.4 below.
of Weaving Terms). Technical and cost data for each stage were collected during fieldwork, and the range of techniques in use for most of the other stages is generally as wide as that for weaving itself. In principle, a 'technique' could be defined as a particular combination of 'sub-techniques' (ie. one technique from each stage of production), and this would generate a much greater range of techniques in the weaving industry. However, weaving is by far the most important stage of production in the industry, and the incorporation of different techniques from the other stages would only complicate the analysis without altering significantly the results.

Secondly, it should be noted that there are limits to the predictive power of our analysis. The effect of a change in input prices on the selling price of cloth produced by a given technique cannot be determined with certainty. This limitation applies particularly to our discussion of the effects of a devaluation on selling prices (see Chapter Ten). Similarly, as the cloth produced by different techniques are not perfect substitutes, without a fully specified consumer utility function the ultimate effect on the composition of weaving output (by technique) of a change in selling prices cannot be predicted with certainty. Nevertheless, it is important to remember that the products of different techniques in the weaving industry are closer substitutes than is the case for almost any other manufacturing industry.

Thirdly, the range of cloth produced in Indonesia is very wide. It includes cambric (blaco, or grey cloth for batik), sarung, suiting, table cloths, serviettes, canvas products, furniture fabrics, curtains, mosquito netting and various traditional cloths (stagen, selendang, etc.). Furthermore, for each type of cloth there is a considerable range of quality,

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3 Assuming there are on average three technically efficient techniques for each of the five major stages of production, 15 possible techniques would be generated for the industry as a whole using this approach.
depending on its construction (defined by the weft and warp), yarn type (synthetic, cotton or mixture) and quality. There is however, some specialisation in the type and quality of cloth produced by each of the techniques. Because this analysis is examining the scope for a switch to more labour-intensive techniques given a change in relative factor prices and government policies, only those types of cloth produced by all the main techniques are considered. Although this excludes certain types of cloth, the two major types - cambric and sarung - are included because they are produced across the spectrum of techniques. Cambric is important because it is the cloth used for batik; sarung continue to be widely worn despite changes in the pattern of consumer demand in recent years. In the next three sections and Chapter Ten the analysis will be conducted for medium quality cambric. Section 9.6 below will assess the performance of the techniques in the production of sarung.

9.3 Construction of the Isoquant

This section explains in detail the construction of the isoquant for medium quality cambric, which is unfinished grey cloth (blaco) used for making batik. 30s cotton yarn is used for both warp and weft; the number of picks and reed number is 60 (technical terms are explained in the Glossary of Weaving Terms). Yarn usage is 5.1 kgs per pis (1 pis = 45 metres) and is the same for all techniques.

In the production of cambric, four main techniques are available. These are:

M3 Imported, fully-automatic mechanised looms, with automatic weft change. Installed factory price in 1977 was Rp 2.2 million per loom for Japanese models. Several more

4 Certain types of cloth are produced only in capital-intensive mills (eg. some canvas goods, very high quality cambric (primissima)); others are produced only in hand loom and smaller power loom mills (eg. gauze, blankets), whilst handicraft and decorative cloth is produced only on hand looms.
expensive Europeans brands are available, as also are cheaper Chinese and South Korean brands. The operator: loom ratio is 1:30-35 per shift.

M₂ Imported, semi-automatic looms (the machine stops when the weft is exhausted). Installed factory price in 1977 was Rp 1.4 million for Japanese looms; the labour: loom ratio is 1:4 per shift.

M₁ Domestically-manufactured, non-automatic looms (the machine does not stop when the weft is exhausted). The price was Rp 400,000, and the labour: loom ratio is 1:2 per shift.

H Hand Loom. The new price was Rp 50,000 to Rp 75,000. However, they were available second-hand and in good condition for Rp 10,000 or less. The labour: machine ratio is 1:1 per shift.

Five steps are necessary to construct the isoquant for cambric. The steps are as follows:

Step 1: Calculation of value added per metre of cloth by technique

Table 9.1 shows the basic steps involved in the calculation of value added per metre for each technique. Although cloth construction, yarn type and use are identical between techniques, there is considerable variation in value added per metre. In fact, the value added of the most capital-intensive technique (M₃) exceeds that of the hand loom by almost Rp 8 per metre. This difference arises for three reasons:

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The procedure adopted is similar to that of Timmer (1973: 64-68). However, our steps are considerably more complicated owing to difficulties in calculating value added per metre of output, the (necessary) assumption of different wage levels by technique, the existence of preparation stages in addition to the actual weaving process, and the incorporation of working capital.
### Table 9.1: Calculation of Value Added Per Metre for Cambric (Rp)

<table>
<thead>
<tr>
<th>Item</th>
<th>Technique</th>
<th>H</th>
<th>M₁</th>
<th>M₂</th>
<th>M₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling Price</td>
<td></td>
<td>183.33</td>
<td>188.89</td>
<td>192.78</td>
<td>197.78</td>
</tr>
<tr>
<td>Expenses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn</td>
<td></td>
<td>136.94</td>
<td>136.01</td>
<td>134.54</td>
<td>133.63</td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Repair &amp; Maintenance</td>
<td></td>
<td>1.5</td>
<td>2</td>
<td>3</td>
<td>4.25</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td>0.5</td>
<td>1</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td></td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>147.94</td>
<td>152.01</td>
<td>151.54</td>
<td>154.63</td>
</tr>
<tr>
<td>Value Added</td>
<td></td>
<td>35.39</td>
<td>36.88</td>
<td>41.24</td>
<td>43.15</td>
</tr>
</tbody>
</table>

(i) Differences in the selling price. This ranges from Rp 197.7 per metre for M₃ cloth to Rp 183.3 per metre for H cloth. This indicates how misleading is the assumption that product quality is invariant to technique. Even though raw material inputs are the same, the selling price of M₃ cloth is almost 8 percent above that of H cloth. If inferior quality yarn is used by the labour-intensive firms, as is sometimes the case, the price range is greater still (but yarn is a relatively homogeneous good).

---

6 Prices are usually quoted per pis (45 metres), which have been taken as M₃ Rp 8,900, M₂ Rp 8,675, M₁ Rp 8,500 and H Rp 8,250. Note that cambric is produced mainly in Central Java and the Special District of Yogyakarta. These prices are taken from firms in these two provinces, and standardised at August 1977 levels.
(ii) Differences in yarn prices. Because size and capital intensity are closely related, M₃ firms have lower yarn costs per metre. The range is over Rp 3, although it would be greater if some of the small, seasonal hand loom firms were included. This difference reflects the importance of pecuniary economies of scale: large firms are able to obtain yarn at lower prices because their orders are larger. It should be emphasised that these yarn costs are based on average prices paid by our sample of firms, and that the results were checked with yarn traders. Much depends on the business contacts and commercial acumen of the owner. Further, these are cash prices. In practice, many weavers buy yarn on credit from textile traders (in fact, as was pointed out in Chapter Six, they are one of the main credit sources for hand and small power loom weavers), hence it is necessary to subtract the interest component to obtain the cash price.

(iii) Differences in other costs. Several of these items require further explanation. First, electricity costs per metre rise with the degree of capital intensity because the modern techniques have a range of ancillary equipment (air conditioners, etc.) and far superior lighting. However, total electricity costs for techniques M₂ and M₃ do not appear in Table 9.1 because these firms usually possess their own generating capacity. Hence, 'electricity costs' for these firms refer to the cost of running generators; capital costs are included with other items of capital. On the other hand, M₁ firms rarely possess a generator and rely instead on mains electricity from the PLN. Thus Rp 3 is the total
cost of electricity per metre of output.\textsuperscript{7} Secondly, repair and maintenance costs rise with capital intensity because much stricter standards of quality control are enforced; better quality parts are used and they are replaced more frequently.

Thirdly, preparation costs are subtracted from total revenue in the calculation of value added. That is, it is assumed that firms purchase the product of the preparation stages and, as a purchased input, it is subtracted from the selling price. In practice, of course, most firms possess their own preparation units.\textsuperscript{8} Thus only running costs would be subtracted in the calculation of value added; capital costs would be included with other items of capital. However, because we wish to concentrate only upon the choice of technique in the weaving stage, the analysis is simplified by excluding the preparation stages from the analysis and treating the cost of these stages as a purchased input. Note that preparation costs rise with the capital intensity of the technique. This is for the same reason that the selling price rises - the product is of higher quality.\textsuperscript{9}

\textsuperscript{7} Because total electricity costs are included for \(M_1\) but only the running costs of generators for \(M_2\) and \(M_3\), the effective difference in value added per metre between \(M_1\) and the two more mechanised techniques is overstated.

\textsuperscript{8} Nevertheless, it is not unusual for mills to have only partial preparation units, in which case the output of the preparation stages does become an intermediate good. Several plants operate under the GKBI umbrella in this way. See also the discussion of sub-contracting in Chapter Four (section 4.8).

\textsuperscript{9} Preparation costs are based on full cost pricing, which includes operating costs plus a return to capital. Whether in fact they represent market prices were the output of the preparation stages to be sold involves the complex question of cost-based or demand-based pricing.
Step 2: Machine Output Per Year for each Technique

Assumed output per machine per year for each technique is given in Table 9.2. For M₃ and M₂, output per shift is approximately 90 percent of maximum potential output, for M₁ is somewhat less, whilst the term 'capacity utilisation' has little relevance for H. For the three mechanised techniques looms are usually idle for three weeks of the year - two weeks following the celebrations to mark the completion of the Moslem fasting month (Idul Fitri), and one week for repairs and the annual maintenance overhaul. Hand looms require no such overhaul, and can operate 50 weeks of the year.

M₂ and M₃ firms generally possess their own generators, hence they may - and usually do - operate three shifts per day. This is in marked contrast to the orde lama period when shortages of yarn, spare parts and electricity restricted firms to two or less shifts. Some large mills operate seven days per week, but this is relatively uncommon. In the case of M₁ firms, two shifts per day is the norm. Lower wages create labour problems which would make a 24 hour operation more difficult. (The link between wage levels and absenteeism and separation rates was discussed in Chapter Seven, section 7.2.) Also, using PLN electricity limits their operations in two ways. First, the PLN's tariff rises very steeply between six p.m. and midnight, as a means of deterring extra demand

Table 9.2: Monthly and Annual Output per Loom (metres)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Output/shift</th>
<th>Shifts/day</th>
<th>Days/week</th>
<th>Weeks/year</th>
<th>Total</th>
<th>Average Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>10</td>
<td>1</td>
<td>5</td>
<td>50</td>
<td>2,500</td>
<td>208</td>
</tr>
<tr>
<td>M₁</td>
<td>16</td>
<td>2</td>
<td>6</td>
<td>49</td>
<td>9,408</td>
<td>784</td>
</tr>
<tr>
<td>M₂</td>
<td>22</td>
<td>3</td>
<td>6</td>
<td>49</td>
<td>19,404</td>
<td>1,617</td>
</tr>
<tr>
<td>M₃</td>
<td>28</td>
<td>3</td>
<td>6</td>
<td>49</td>
<td>24,696</td>
<td>2,058</td>
</tr>
</tbody>
</table>

somewhat less, whilst the term 'capacity utilisation' has little relevance for H. For the three mechanised techniques looms are usually idle for three weeks of the year - two weeks following the celebrations to mark the completion of the Moslem fasting month (Idul Fitri), and one week for repairs and the annual maintenance overhaul. Hand looms require no such overhaul, and can operate 50 weeks of the year.

M₂ and M₃ firms generally possess their own generators, hence they may - and usually do - operate three shifts per day. This is in marked contrast to the orde lama period when shortages of yarn, spare parts and electricity restricted firms to two or less shifts. Some large mills operate seven days per week, but this is relatively uncommon. In the case of M₁ firms, two shifts per day is the norm. Lower wages create labour problems which would make a 24 hour operation more difficult. (The link between wage levels and absenteeism and separation rates was discussed in Chapter Seven, section 7.2.) Also, using PLN electricity limits their operations in two ways. First, the PLN's tariff rises very steeply between six p.m. and midnight, as a means of deterring extra demand
on an already overloaded system. Secondly, being connected to mains electricity usually (though not always) implies that the factory will be located in an urban area. Factories in urban areas can be restricted in their hours of operation if neighbours complain of excessive noise.

A number of factors explain the lower utilisation of hand looms: these firms usually do not have electricity, so night work is not possible; payment is by piece-rates (borongan), thus the owners have less incentive to inculcate 'factory discipline' in the workers, in the sense of arriving promptly for work, etc.; low wages result in high rates of absenteeism, particularly during busy agricultural seasons; and finally, since hand loom firms serve a lower income clientele, demand for their products tends to be more seasonal. For all these reasons it is unrealistic to assume more than 250 operating days per year. Few hand loom firms in our sample operated for a significantly longer period than this.

Step 3: Investment Costs

Investment costs per loom are given in Table 9.3. Machine costs refer to the installed cost for new machinery in 1977 for techniques M₃, M₂ and M₁. Since used hand loom are in plentiful supply, in Java at least, it is realistic to assume a firm would not purchase these new. Used looms in good condition are available for Rp 10,000 in Java,¹⁰ although many weavers are able to acquire them at no cost. A zero price could be included, although it is more relevant to think in terms of the 'opportunity cost' of a hand loom and Rp 10,000 is a reasonable approximation. Moreover, working capital is the most important item of capital for hand loom firms, so the price of hand looms is not a significant factor.

¹⁰ Note that in the neighbouring island of Bali, where a flourishing handicraft hand weaving industry exists, the minimum price for a used loom is Rp 50,000. It is unlikely that transport costs are the whole explanation of the difference. Lack of information is an equally important factor. Hand weavers interviewed in Bali expressed surprise at the price of used looms in Java.
Table 9.3: Investment Costs Per Loom (Rp)

<table>
<thead>
<tr>
<th>Item</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Machinery</td>
<td>10,000</td>
</tr>
<tr>
<td>Land²</td>
<td>7,500</td>
</tr>
<tr>
<td>Building³</td>
<td>6,250</td>
</tr>
<tr>
<td>Other Fixed Capital</td>
<td>-</td>
</tr>
<tr>
<td>Working Capital⁴</td>
<td>38,193</td>
</tr>
<tr>
<td>Total</td>
<td>61,943</td>
</tr>
</tbody>
</table>

Notes: Investment costs calculated as follows:

a Land.

<table>
<thead>
<tr>
<th>Technique</th>
<th>H</th>
<th>M₁</th>
<th>M₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>5m² @ Rp 1,500/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₁</td>
<td>16m² @ Rp 3,000/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₂</td>
<td>20m² @ Rp 3,000/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₃</td>
<td>30m² @ Rp 3,000/m²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b Buildings.

<table>
<thead>
<tr>
<th>Technique</th>
<th>H</th>
<th>M₁</th>
<th>M₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>2.5m² @ Rp 2,500/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₁</td>
<td>8m² @ Rp 8,000/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₂</td>
<td>10m² @ Rp 12,000/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₃</td>
<td>15m² @ Rp 17,000/m²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c Working capital.

<table>
<thead>
<tr>
<th>Technique</th>
<th>H</th>
<th>M₁</th>
<th>M₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>equivalent to the value of one month's production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₁</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M₂</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M₃</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
The amount and quality of land per machine varies considerably between techniques: hand loom firms have little land and are generally located in rural areas; small mechanised firms use 'undeveloped' but urban land sites; and the modern firms locate on spacious, prepared factory sites, generally on the fringe of urban areas. The range in building structures is even greater, from the modern, spacious plants of M_3 firms to the simple gedek (woven bamboo) structure for hand looms. These differences are reflected in larger and more expensive buildings for the capital-intensive techniques (see Table 9.3). Other fixed capital costs are for office and ancillary equipment, including generators, humidifiers, etc. It should be noted that the gestation period – from the purchase of land and building of the plant to the operation stage – is not long for weaving mills, but it does vary directly with the capital intensity of the technique employed. To allow for this in our calculations, land and building costs have been adjusted proportionately for the mechanised techniques.

The final item of capital is working capital, which mainly includes the stock of raw materials, work-in-progress, unsold final goods, and accounts outstanding. The value of working capital also varies greatly between techniques. Large, capital-intensive mills can ill-afford to have machinery lying idle because of yarn shortages, and prefer to be in a position to immediately service large orders. For these reasons, working capital per loom for these mills is much greater than that of hand loom firms. The latter tend to lead a hand-to-mouth existence, buying yarn as they require it – perhaps every two or three days – and selling their cloth as soon as possible. (Working capital requirements for each technique, valued in terms of final output, are given in Table 9.3.)

---

11 This is an over-simplification. A number of hand loom and small mechanised firms occupy substantial buildings, sometimes on prime real estate locations. These are usually long established firms, which flourished in the 1950s and early 1960s.
One difficulty in the treatment of capital is that not all items of capital physically deteriorate during the life of a project. Machinery and buildings will have a zero scrap value at the end of a project; however land and working capital, assuming zero inflation (which is implicitly assumed in our analysis because real interest rates are used), will have the same nominal value at the end of the project as at the beginning. In theory, these items could be incorporated into our analysis by discounting the value of each at end of the project back to the beginning, and subtracting it from the current value at year 0. That is, assume their value at year 0 = X; hence, after \( n \) years at a discount rate \( r \), their value is 

\[
X \frac{1}{(1+r)^n}
\]

Therefore, the effective cost of land and working capital at the commencement of the project is 

\[
X - X \frac{1}{(1+r)^n}
\]

In practice, this is extremely tedious operationally because it means that the isoquant depends on the rate of interest. Since an interest rate must be specified in order to calculate investment costs, a new isoquant must be constructed for each interest rate and for each technique. Fortunately however, the subtraction of discounted working capital and land from initial investment costs has little effect on overall capital requirements. This is because the present value of amounts discounted over long periods is very small, even at quite low interest rates. Looms have an economic life of about 25 years (for hand looms, being purchased second-hand, it is around 20 years\(^1\))\(^2\). In our calculations, it was found the assumption that the life of the project is five years greater than the economic life of the machinery produced almost identical results to the subtraction of discounted capital values, with

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\(^1\) It might be argued that in the case of hand looms this period is too short. For example, Fisk (1960:14) in his study of the hand loom industry of the east coast of Peninsular Malaysia assumed a working life of 40 years. Much depends on the quality of timber used and maintenance standards.
the benefit of greatly simplified computational procedures. To test the effect of this assumption, boundary wage rates as calculated in Table 9.6 below were recalculated for the mechanised techniques using the theoretically correct approach. (It was not necessary to test for hand looms because at the high interest rates these firms face, the present value figures are insignificant.) Only minimal differences were found between the two approaches. In fact, a divergence arises only at very low interest rates - well below the shadow interest rates assumed in section 9.5 for all techniques. Thus, lengthening the project's life is a crude but effective computational simplification. 13

Step 4: Wage Rates and Labour: Machine Ratios

Wage levels in firms employing each of the techniques were discussed in detail in Chapter Seven. Although there are considerable intra-technique wage differentials, it was argued that the following annual wage levels (which include fringe benefits) are typical of those prevailing in 1977 (see Table 7.1):

\[
\begin{align*}
M_3 & : \text{Rp} \, 240,000 \\
M_2 & : \text{Rp} \, 150,000 \\
M_1 & : \text{Rp} \, 105,000 \\
H & : \text{Rp} \, 52,000 \\
\end{align*}
\]

A major problem is the incorporation of non-production labour. This arises because the ratio of production to non-

13 The reason the two approaches produce similar results is that two factors tend to cancel each other out. On the one hand, the assumption that working capital and land have a zero value at the end of a project adversely affects the performance of the more capital-intensive techniques, because working capital and land per loom for these techniques is greater. On the other hand, lengthening the period of a project improves the economic performance of the more capital-intensive techniques because there is a greater period over which capital may be depreciated; hence capital costs per year are less.
production labour varies by technique, and because wage levels differ between these two groups of employees. There are three possible solutions to the problem:

(i) To weight all labour by the wage paid to operative labour. If, for example, non-production workers in M3 firms were paid on average Rp 480,000 per year, they would have a weighting of two production labourers. This is the simplest approach operationally.

(ii) To disaggregate labour into production and non-production labour and thus have three factors of production (capital and two types of labour). This is analytically the most interesting method, and with it a number of important issues could be examined. For example, to what extent does machinery substitute not for unskilled production labour but skilled (non-production) labour? For developing countries, where skilled labour is generally scarce, this is an important question. If machinery substitutes for skilled labour then fears that mechanisation will lead to the widespread displacement of unskilled workers are unwarranted. However, the difficulty with this approach is that non-production labour is an extremely heterogeneous group, ranging from part-time family supervisors in rural hand loom firms to western trained accountants and technicians in the most modern foreign-owned firms. Little is gained by calling all such labour 'skilled'.

(iii) To consider all employees whose wage exceeds that of operative labour as embodying human capital, the skills of which are explicitly accounted for in the higher wage they command in the market. Using this approach, it is argued that the difference between production and non-production wages should be treated as an item of capital, by capitalising it at
the going interest rate and adding it to the stock of fixed capital. This might be the most correct procedure theoretically, although several problems arise. It implies that the labour market in Indonesia is far more nearly perfect than it in fact is. Moreover, it ignores real regional wage differentials (which should not be capitalised) and the role of koneksi (good connections) in securing well-paid employment. In addition, the shortage of skilled labour in Indonesia over the last decade, owing to the onset of rapid industrialisation, has led to a very considerable gap between the wages of skilled and factory labour. As the supply of skilled labour increases and the pace of industrialisation slows down, this gap might be expected to narrow relatively (on this point, see Manning, 1979:142-143). If this is correct, this method would exaggerate the capital intensity of techniques M_3 and M_2 now compared to that in, say, five years time. Finally, the skilled/unskilled wage differential is not a capital cost to the firm, in the sense of its cost varying according to the interest rate charged. In any case, some calculations were done using this method, and it was found to have little effect on the results.

Thus method (i) is adopted as the simplest approach. 'Weighted' labour:machine ratios are calculated for each technique, and the results presented in Appendix 9.1.

**Step 5 : Construction of the Isoquant**

These four steps complete, the isoquant for cambric can be constructed. The data are shown in Table 9.4. The first step is to record unit data - annual output, investment costs per machine and (weighted) labour:machine ratios for each technique. As we wish to calculate, in effect, an 'iso-value added', two additional steps are necessary. The data are expressed initially in terms of a given quantity of output (here, for convenience,
Table 9.4: Isoquant Calculations, Cambric

<table>
<thead>
<tr>
<th>Technique</th>
<th>H</th>
<th>M₁</th>
<th>M₂</th>
<th>M₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data/unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Output (m)</td>
<td>2,500</td>
<td>9,408</td>
<td>19,404</td>
<td>24,696</td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>61,943</td>
<td>791,157</td>
<td>2,343,451</td>
<td>3,862,578</td>
</tr>
<tr>
<td>Labour : Machine</td>
<td>1.06:1</td>
<td>0.74:1</td>
<td>0.5:1</td>
<td>0.28:1</td>
</tr>
<tr>
<td>Data/10,000 metres</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>247,772</td>
<td>840,941</td>
<td>1,207,715</td>
<td>1,564,050</td>
</tr>
<tr>
<td>Labour (units)</td>
<td>4.24</td>
<td>0.787</td>
<td>0.258</td>
<td>0.113</td>
</tr>
<tr>
<td>Value Added (Rp)</td>
<td>353,900</td>
<td>368,800</td>
<td>412,400</td>
<td>431,500</td>
</tr>
<tr>
<td>Data/Rp 3 million V.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>2,100,356</td>
<td>6,840,624</td>
<td>8,785,515</td>
<td>10,874,044</td>
</tr>
<tr>
<td>Labour (units)</td>
<td>35.94</td>
<td>6.40</td>
<td>1.88</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Isoquant Slopes:  
- $M₃ - M₂ = 1,916,082$  
- $M₂ - M₁ = 430,286$  
- $M₁ - H = 160,474$
10,000 metres). This involves multiplying investment costs and labour by the ratio 10,000 metres divided by annual output. Owing to the substantial differences in physical capacity, the range in investment costs per 10,000 metres between the least and most capital-intensive technique is now much reduced. The final step is to standardise the data by calculating investment costs and labour units for each technique for a given value added. Thus investment costs and labour are multiplied by three million and divided by the value added of 10,000 metres of cloth produced by that technique (Rp 3 million is chosen for convenience in drawing the graph). That is, hand loom data are multiplied by 3,000,000, M₁ data by 3,000,000, etc. The isoquant is graphed in Figure 9.2, by plotting the units of labour and investment cost required to produce Rp 3 million value added for each technique. For reasons of clarity, the segment of the isoquant representing the three mechanised techniques is shown in Figure 9.3.

What conclusions can be drawn from the isoquant? Two main findings emerge. First, the range in terms of investment costs and units of labour required to produce a given value added is very great. For hand looms, a little over Rp 3 million of capital and 36 units of labour are required; at the other extreme, for technique M₃, almost Rp 11 million of capital but less than one unit of labour are required. Secondly, and more important, because the isoquant is convex to the origin, from Figure 9.2 alone it can be concluded that all four techniques are technically efficient. No technique uses more of both factors of production to produce a given value added compared to any other technique. Moving from technique M₃ to technique H, each successive technique uses more labour and less capital to produce a given value added. This emphasises the point above.

14 Thus investment costs and the labour:machine ratio for hand looms are multiplied by four (10,000), those for M₁ by 10,000, and so on.
Figure 9.2: The Isoquant for Cambric

- Iso-cost lines for 'typical' actual factor prices (Table 9.5)
- Iso-cost lines for shadow factor prices (Table 9.8)
Figure 9.3: The Isoquant for Cambric, Power Looms Only

- Iso-cost lines for 'typical' actual factor prices (Table 9.5)
- Iso-cost lines for shadow factor prices (Table 9.8)
that low labour productivity techniques such as hand looms can still be technically efficient because their capital-output ratio is so low. Assertions that hand looms are 'inefficient' thus require careful qualification.

9.4 Economic Efficiency and the Rationality of Investors in the Weaving Industry

9.4.1 Calculation of the Iso-cost Line

No conclusion can be reached regarding the economic efficiency of the techniques and the economic rationality of investors in choosing them without first specifying factor prices. With wage and interest rates given, an iso-cost line can be drawn. If this line is tangential to the point on the isoquant representing a particular technique (or, since we are dealing with an isoquant which represents a discrete production function, if the iso-cost line does not cross the isoquant), that technique is economically efficient and investors are economically rational to choose it.

What factor prices should be used? Because we wish to test for investor rationality, actual prices must be chosen. As was pointed out in Chapters Six and Seven, a range of interest and wage rates apply to firms employing the same technology. However, the wage rates given in the previous section may be regarded as typical. In specifying interest rates, several difficulties arise. First, real rather than nominal interest rates must be used. Suppose inflation occurs at an annual average rate of i percent over the economic life of the project and the real rate of interest is r percent. If wages are discounted at the nominal rate, the present value of a stream of annual wages is given by

\[ PV = \frac{W}{1 + (r+i)} + \frac{W}{(1 + (r+i))^2} + \ldots + \frac{W}{(1 + (r+i))^n} \]

Discounting annual wages by the nominal interest rate (ie. r+i) effectively understates the real wage cost. Hence, real interest rates must be used. Yet real lending rates from the state
commercial banks - the major source of credit for domestically-owned factories in the modern sector in Indonesia - have fluctuated considerably during the 1970s. This is because nominal rates have been relatively stable, but the inflation rate has varied between years. From 1969 to 1971 real interest rates were high and positive, but throughout the mid 1970s real rates (at least officially) were negative. More recently, real rates have become positive (see Table 6.3). Clearly, in specifying interest rates much depends on which year is chosen. For our purposes, a median real interest rate from the State banks of six percent is used for the $M_3$ firms. Owing to the fragmentation of the capital market, the range of interest rates between firms employing different techniques is considerable. Rates which can be regarded as typical for the other techniques are nine percent for $M_2$, 15 percent for $M_1$ and 24 percent for $H$.

Having specified wage and interest rates for each technique, the relevant iso-cost lines can be calculated. It will be recalled from Chapter Eight (Appendix 8.1) that the slope of this line is in fact equivalent to the present value of the annual wage paid over the economic life of the machinery. That is, the slope of the iso-cost line equals the present value of the capitalised wage cost. The present values of annual wages for each technique, discounted at the 'actual' real interest rate faced by firms employing each technique, are calculated using the annuity formula and presented in Table 9.5. For the three mechanised techniques, wages are discounted over a 30 year period, which is the economic life of new machines. For hand looms, which are assumed to be purchased second-hand, the discount period is 25 years. The four iso-cost lines are graphed on the isoquants in Figures 9.2 and 9.3 with the appropriate technique. (The isoquant and iso-cost lines for the three mechanised techniques can be read more clearly from Figure 9.3.) The capitalised wage cost represents the value on the Y intercept of one unit of labour ($X = 1$).
Table 9.5: Iso-cost Slopes, Actual Prices

<table>
<thead>
<tr>
<th>Technique</th>
<th>Wage/Year (Rp)</th>
<th>Working Life (years)</th>
<th>'Actual' Interest Rate (%)</th>
<th>P.V. of Wages (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M₃</td>
<td>240,000</td>
<td>30</td>
<td>6</td>
<td>3,303,560</td>
</tr>
<tr>
<td>M₂</td>
<td>150,000</td>
<td>30</td>
<td>9</td>
<td>1,541,048</td>
</tr>
<tr>
<td>M₁</td>
<td>105,000</td>
<td>30</td>
<td>15</td>
<td>689,428</td>
</tr>
<tr>
<td>H</td>
<td>52,000</td>
<td>25</td>
<td>24</td>
<td>215,666</td>
</tr>
</tbody>
</table>

Note: a Calculated from the annuity formula

$$Q = W \left[ \frac{1}{r} \left( 1 - \frac{1}{(1+r)^n} \right) \right]$$

Graphing the isoquant and iso-cost lines enables us to reach some conclusions regarding the economic efficiency of the four techniques. If actual factor prices are assumed, the two capital-intensive techniques (M₃ and M₂) are economically efficient, and thus rational from the point of view of profit-maximising investors. This is because their iso-cost lines are tangential to the appropriate point on the isoquant. However, the two labour-intensive techniques (M₁ and H) are not, because the iso-cost lines cut the isoquant. This is a major finding in our study: frequently it is asserted that investors in the modern manufacturing sector of LDCs adopt techniques which are 'too' capital-intensive. Yet what Figures 9.2 and 9.3 show is that in the Indonesian weaving industry it is perfectly rational for private investors, at the wage and interest rates they face, to adopt techniques M₃ and M₂. Perhaps ironically, for a low-wage labour-abundant economy such as Java, it is the two labour-intensive techniques that are not economically efficient, unless wages are substantially lower or interest rates substantially higher than those assumed in Table 9.5. Rational private investors with access to the formal credit market (including the bottom of the range of rates charged by the
private domestic banks) would not be expected to adopt these techniques.

9.4.2 The Calculation of Boundary Prices

Over what range of factor prices is each technique economically efficient? For example, up to what interest rate would it be profitable for private investors to adopt technique M₃? And what annual wage can be 'afforded' by handloom firms for a given interest rate before it becomes profitable to switch to technique M₁? These questions can be answered by calculating 'boundary prices' for each technique. Presenting the data in this way provides a more comprehensive picture of our results. Using the graphical method (i.e., drawing an isoquant and iso-cost line) allows us to test for economic efficiency only at that combination of wage and interest rates specified in calculating the slope of the iso-cost line. The procedure for calculating boundary prices is as follows: from the slope of the isoquant between each technique, the maximum and minimum slope of the iso-cost line consistent with a tangency solution can be calculated. Since the slope of this line is equivalent to the present value of the stream of annual wages over the economic life of the project, the slope of each segment of the isoquant represents the maximum and minimum capitalised 'life-time' wage for the relevant technique. For a given annual wage and discount period the maximum and minimum values can be obtained.

Since techniques M₃ and H are at either end of the isoquant, only a single value (maximum or minimum) can be calculated. For the 'intermediate' techniques M₂ and M₁ however, both maximum and minimum values can be obtained.

For example, in the case of technique M₂ the slope of the isoquant to the left of the point representing this technique is 10,874,044 - 8,785,515 = Rp 1,916,082. This figure represents the maximum value of the capitalised 'life-time' wage consistent with economic efficiency. Similarly, the slope of the isoquant to the right is 8,785,515 - 6,840,624 = Rp 430,286, which is the minimum value of the capitalised 'life-time' wage. (The slope of each segment of the isoquant is given at the bottom of Table 9.4.)
interest rates consistent with economic efficiency (ie. a tangency solution) can be calculated. Alternatively, the interest rate can be held constant, and maximum and minimum annual wages calculated.

Calculations were carried out for each technique using the annuity formula, and the results are presented in Table 9.6. Two sets of data are provided. First, a range of interest rates is assumed - 12, 24 and 36 percent - and the minimum and maximum annual wages for economic efficiency are calculated. For example, assuming a real annual interest rate of 12 percent, technique M₃ is economically efficient down to an annual wage of Rp 237,869,¹⁷ below which investors would switch to M₂. M₂ would be adopted by cost-minimising investors at an annual wage of between Rp 53,417 and Rp 237,869. Hand looms are economically efficient up to an annual wage of Rp 20,460 if the interest rate is 12 percent. As one would expect, they are economically efficient only at much higher interest rates. It should be noted that the upper and lower boundary wage levels are the same for techniques M₃ and M₂, and for M₂ and M₁. This is because the present value of annual wages, the interest rate, and the number of years are the same. These boundary prices differ for techniques M₁ and H however, because hand looms, being purchased second-hand, are assumed to have a shorter economic life. In the second part of the table, typical wage levels for each technique (those given in Step 4 of the previous section) are specified, and a range of interest rates consistent with economic efficiency calculated.¹⁸ In contrast to the boundary wage rates, there is some overlap of the boundary interest rates between techniques. This is because a single

¹⁷ This is calculated by using the annuity formula in reverse, that is \( 1,916,082 = W \left[ \frac{1}{1.12} \left( 1 - \frac{1}{1.12^{25}} \right) \right] \) and solving for \( W \).

¹⁸ Note that the interest rate so derived is a unique solution, unlike the internal rate of return. The latter is an ambiguous criterion by which to compare projects, the yields of which have different time paths. (On the limitations of the internal rate of return, see Little and Mirrlees, 1974:13-14.)
Table 9.6: Boundary Prices, Cambric (n = 30 years)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/ min</td>
<td>12</td>
</tr>
<tr>
<td>M₃</td>
<td>min</td>
<td>237,869</td>
</tr>
<tr>
<td>M₂</td>
<td>max</td>
<td>237,869</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>53,417</td>
</tr>
<tr>
<td>M₁</td>
<td>max</td>
<td>53,417</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>19,922</td>
</tr>
<tr>
<td>H</td>
<td>max</td>
<td>20,460</td>
</tr>
</tbody>
</table>

Notes: a For all mechanised techniques, n = 30 years
For H, n = 25 years
b Wages for each technique are:
M₃ 240,000
M₂ 150,000
M₁ 105,000
H  52,000
wage rate is specified for each technique in the calculation of boundary interest rates. For example, technique M₂ is economically efficient between 6.7 and 34.9 percent only if the annual wage is Rp 150,000; similarly for M₃ at an interest rate below 12.1 percent if the wage is Rp 240,000. This overlap of boundary prices has important implications for the co-existence of different techniques, an issue which will be addressed in the final chapter.

From Table 9.6 it is possible to ascertain quickly the range of factor prices for which the four techniques are economically efficient. What conclusions can be drawn from the data? The two more capital-intensive techniques, M₃ and M₂, are economically efficient for most combinations of factor prices which firms employing these techniques are likely to face. M₃, the technique adopted by most foreign and very large domestic firms, is rational up to a real interest rate of over 12 percent at current wage levels. For most of the 1970s real rates from the state commercial banks have been less than this, as have rates from foreign credit sources (ignoring the exchange rate risk). In fact, assuming an actual real interest rate of six percent, the present value of an annual wage of Rp 240,000 over 30 years is over Rp 3 million (see Table 9.5), yet this 'life-time' wage could be as low as Rp 1.92 million (the slope of the isoquant between M₃ and M₂, from Table 9.4) for the technique to be adopted. Hence wages could be lowered considerably at this low interest rate and M₃ would still be economically efficient.

M₂ emerges as the most flexible of the techniques. At current wage levels it is economically efficient for a wide range of interest rates, from just over six percent (near the bottom of the range of interest rates in the formal credit market), to almost 35 percent. Similarly, at most conceivable interest rates, its boundary wage levels include those paid to weavers in the factory sector.
Techniques $M_1$ and $H$ are economically efficient only at high interest rates - equivalent to those prevailing in the informal money market - at the typical annual wages. The minimum interest rate for which $M_1$ is rational is similar to the bottom of the range of rates prevailing in the informal money market in 1977 of 3 percent per month (our boundary interest rates refer to real rates). Conversely, if credit were obtained from state commercial banks at a real rate equivalent to 12 percent (or, more likely, less than this), Table 9.5 indicates what would be the maximum annual wage consistent with economic efficiency for the two labour-intensive techniques. For $M_1$ this is just over Rp 53,000, or about half the typical wage found in these firms. For hand looms, the maximum wage is less than half the actual wage in these firms (of Rp 52,000). Earnings as low as Rp 21,500 per year might be found in very poor regions, or in off-season household activities when the opportunity cost of labour is very low. Alternatively, it gives some idea of the magnitude of the wage subsidy required if a decision was taken to 'prop up' hand loom weaving while permitting access to the formal credit market.

In interpreting the boundary wage data in Table 9.6, one important qualification should be emphasised. In Chapter Seven (section 7.3) we drew attention to the fact that wage levels are likely to have some effect on labour productivity, especially in the low-wage labour-intensive firms. The link between wages and labour productivity has received relatively little attention in LDC labour market studies, and even less in the choice of technique studies. Most of the latter implicitly assume that wages may be freely adjusted without any effect on labour productivity. Clearly this is not the case. The greater the difference between the 'typical' wage and the boundary wage (especially if the latter wage is lower), the more likely productivity is to be affected. Nevertheless, our boundary wage data remain useful indicators if the differences are not great.
Moreover, the wage levels are relevant to an analysis which employs shadow as distinct from actual factor prices (shadow prices are introduced in section 9.5 below).

9.4.3 The Concept of Rationality

The discussion so far has used the term 'rationality' in a very restricted sense, but the concept requires further elaboration. Two issues are relevant to this discussion. The first of these is why techniques H and M₁ are still in use if they are not economically efficient at current factor prices. Are entrepreneurs who adopt these techniques 'irrational'? Several explanations for the continued use of these techniques may be adduced. First, the handloom sector, whilst still large, has been declining rapidly over the past 15 years, and our analysis shows that this is to be expected. Yet, as the quotation from Professor Ranis above (page 280) points out, traditional techniques and modes of organisation do not disappear immediately with the onset of rapid industrialisation. A cross-sectional picture of the industry, as this is, obscures this adjustment process. Secondly, the owners of small firms frequently inherit all their fixed capital and, providing a profit (ie. total revenue less total operating costs) - however small - is made, they will continue in operation. Indeed, traditional social or family obligations may prevent them from disposing of their capital and leaving the industry. In this sense, they do not correspond to the 'rational economic man' who seeks to maximise the return on a given stock of capital.

A third reason is that very few small weavers would be able to raise sufficient capital to acquire more modern machinery or, if they were able to, it would be at interest rates so high that these techniques would not be economically efficient. To some extent this reflects imperfections in the capital market, although only the larger of these firms would have sufficient collateral and be able to satisfy formal banking requirements. Fourthly, we are discussing the average economic
performance of the techniques in the production of only one type of cloth (albeit a major one). There are considerable intra-technique variations in business performance, and much depends on the commercial acumen and business connections of the individual entrepreneur, that is, the 'X efficiency' factor. The better performers amongst the small mills would be closer to being economically efficient. Moreover, the wage and interest rates chosen as being 'typical' for each technique conceal considerable variations; the higher the real interest rate and the lower the annual wage, the more likely techniques $M_1$ and $H$ will be economically efficient. Finally, there are several types of cloth which, by virtue of their production process or demand characteristics, are more suited to hand or simple power looms. Small mills will continue producing these goods even if they are forced out of cambric. (Some of these successful hand loom firms were discussed briefly in Appendix 4.3.)

The second issue in our discussion of rationality relates to the meaning of the term. Our analysis has assumed that investor rationality is defined in terms of current output and input prices, and that the time horizon of investors coincides with the physical life of the machinery. However, owing to the uncertain business climate in many LDCs it is not 'irrational' for businessmen to adopt criteria other than current prices and a payback period extending over the full life of machinery in evaluating a project. Entrepreneurs' desire for risk avoidance may lead to a reluctance on their part to invest in large-scale projects unless there is a good prospect of substantial and fairly quick returns.

This issue is of some relevance to Indonesia where the business climate, especially for foreign and non-pribumi entrepreneurs, is characterised by much greater uncertainty than is the case in western countries. The last three decades, for example, have witnessed expropriation of foreign property (subsequently returned), regional uprisings, an attempted coup, hyperinflation and periodic anti-Chinese outbursts. On the
other hand, the last decade has seen a return to greater economic and political stability. Foreign investment in mining and manufacturing has become very important. For the Chinese business community, the period since 1968 has probably been the most secure of any time since independence (Mackie and Coppel, 1976:15-16) and one reflection of this is the increased role of the Chinese in the weaving industry. Most of them secure patronage from important military figures, which further adds to their security (these are the so-called cukong relations). Moreover, Indonesian businessmen seek to minimise their equity investment in their factories as a form of insurance against the possibility that, on the worst possible scenario, their factories are expropriated.

Nevertheless, some allowance should be made for the effects of uncertainty in influencing investor behaviour. In principle, there are two possible means of incorporating uncertainty. First, a higher interest rate could be assumed, which includes a premium for risk. That is, risk-averse investors discount future income flows more heavily than the actual interest rate they pay. Secondly, a shorter time horizon could be used, in that businessmen aim for a 'payback' period which is shorter than that of the machinery's physical life. Both methods are somewhat arbitrary, although their general effect - in making capital-intensive techniques less attractive - is similar. The second method is chosen in our analysis because our field research suggests it more accurately reflects the way businessmen actually think. Instead of 30 (or 25) years, this method involves discounting annual wages over a shorter period. What period might be chosen? The loan period for state banks is an important consideration, and this varies from 10 years (for state commercial banks) to 15 years (for the development banks). There is again a 'weighting' problem (see pp. 307-308), in that the necessity for a quick payback presumably refers only to fixed capital; working capital, which is more liquid, can be disposed of more easily in a period of great uncertainty. Assuming a shortened time horizon of
10-12 years for fixed capital (i.e. a little under half the machinery's physical life) and allowing for working capital, a discount period of 15 years is chosen for illustrative purposes.

In order to calculate the slope of the iso-cost line and boundary prices, the procedure is the same as before, except that all cash flows after 15 years are valued at zero, and the scrap value of all investment is nil. Boundary prices are calculated for each technique using the same range of wage and interest rates as Table 9.6 and the results presented in Table 9.7. These may be compared with the results in Table 9.6, which were calculated on the assumption that the payback period coincides with the physical life of machinery. The most important finding is that the most capital-intensive technique is now economically efficient only if the real interest rate is below nine percent, as against 12 percent in the case of 25 years. Nevertheless, even on a short payback period it would still be economically rational for private investors to adopt this technique whilst real lending rates from the state commercial banks and other cheap credit sources are so low. In our analysis above, six percent was taken as a typical rate. On this basis $M_3$ remains economically efficient.

The shortened time horizon has relatively little effect on the two labour-intensive techniques $M_1$ and $H$: the minimum interest rate consistent with economic efficiency falls by only one percent for $H$ and two percent for $M_1$. Why does a halving of the payback period have so little effect? The explanation is that at the higher interest rates applicable to these techniques the results are fairly insensitive to changes in the discount period of much over 10 years. The present value of wages paid ten years or more into the future, discounted at high rates, is

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19 Note that this is not the same as the procedure commonly adopted by large firms of replacing their machinery every 10 or 15 years, since this machinery is sold (i.e. it has a positive value).
Table 9.7: Boundary Prices, Cambria
(n = 15 years)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/ min</td>
<td>max/ min</td>
</tr>
<tr>
<td></td>
<td>12  24  36</td>
<td>(%)</td>
</tr>
<tr>
<td>M₃</td>
<td>min  281,327 478,866 696,707</td>
<td>max  9.1</td>
</tr>
<tr>
<td>M₂</td>
<td>max  281,327 478,866 696,707</td>
<td>max  34.5</td>
</tr>
<tr>
<td></td>
<td>min  63,176 107,537 156,457</td>
<td>min  2.1</td>
</tr>
<tr>
<td>M₁</td>
<td>max  63,176 107,537 156,457</td>
<td>max  65.4</td>
</tr>
<tr>
<td></td>
<td>min  23,562 40,106  58,350</td>
<td>min  23.4</td>
</tr>
<tr>
<td>H</td>
<td>max  23,562 40,106  58,350</td>
<td>min  31.9</td>
</tr>
</tbody>
</table>

Minimal. Hence the assumption of a shortened payback period has little effect on our results. Even if private investors are risk averse, at the relative factor prices they face, the more capital-intensive techniques remain economically efficient.

9.5 Shadow Prices

9.5.1 The Rationale of Shadow Prices

So far, our analysis has been with reference to actual factor prices. Private, profit-maximising investors use commercial profitability as their yardstick and, in their calculations, inputs and outputs are valued at these actual prices. Owing to the divergence between social and private costs and benefits however, commercial profitability is not a proper criterion for evaluating an investment project from a social point of view. According to this approach, projects must be appraised on the basis of prices which reflect a community's social welfare function. This is the rationale of shadow pricing: it represents a modification not of the concepts of profitability and maximisation themselves, but rather the use of actual prices in their calculation. Instead, inputs and outputs are priced on the basis of the social opportunity cost of using such resources. The purpose of this section is to
consider the likely effect of the use of shadow prices on the economic performance of the four weaving techniques. That is, if the criterion of 'social profitability' is adopted, which techniques would emerge as economically efficient?

It should be emphasised that there is some scepticism amongst development economists regarding the usefulness of shadow prices because in practice the determination and application of these prices is an extremely difficult exercise. Strictly speaking, shadow prices refer to the dual of a linear programming solution to a resource allocation problem. For these detailed calculations to be carried out, an objective function which incorporates a community's preferences must be specified. This involves attaching weights to consumption by future as against the present generation, to additional income for the poor as against the rich, and to the distribution of income between regions. However, in practice, as Weckstein (1972:477) observed, such shadow prices are based on models which are limited

... by the assumption of linearity, the crudity and datedness of the statistical information, the excessive simplicity of the objective function, and the arbitrary time horizon during which the objectives are optimised.

The alternative approach adopted by Little and Mirrlees (1974) is to use world prices rather than local market prices in determining accounting prices. As Weckstein (1972:479) admits, this is an administratively simpler approach, but formidable problems still exist. Accounting prices must be calculated for all traded goods (and there is considerable dispute regarding what method should be used to determine these prices), and for non-traded goods such as government services and domestic transportation. A shadow foreign exchange rate, shadow wage rates (for different types of labour and for each region) and the social discount rate (termed the accounting rate of interest) must be determined.
It should also be noted that shadow prices are intended
to correct for a wide range of market failures - market
imperfections arising out of industrial structure (eg.
monopolies), the presence of externalities, and market
distortions which are the result of government policies and
other institutional pressures. In this section we are concerned
only with the latter set of factors.

Thus, it must be recognised that there are important
limitations in the use of shadow prices, and that we are using
them to correct for just one source of market failure (albeit
the major one in the Indonesian weaving industry). Moreover,
a comprehensive set of accounting prices for Indonesia is not
available. Clearly however, the magnitude of factor price
distortion created by government intervention in Indonesia is
very considerable and it should be taken into account. Our
intention is merely to raise the issue of shadow pricing and
to indicate, in very general terms, the effect of using such
prices on the competitiveness of techniques in the weaving
industry.

9.5.2 The Selection of Appropriate Shadow Factor Prices
Owing to the fact that a full set of accounting prices for
Indonesia is not available, we shall consider only shadow wage
and interest rates. What prices should be used? From other
LDCs considerable evidence is available regarding the likely
value of shadow wage and interest rates for different techniques
in the Indonesian weaving industry. On the basis of some of
these studies, some arbitrary but plausible shadow prices can
be used, and their effect on the different techniques
illustrated. In the case of both the wage and interest rate,

20 As part of the ILO mission to the Philippines in the early
1970s, a detailed set of accounting prices was computed
for use in appraisal of public sector investment projects.
It is reasonable to assume that the ratio of market to
accounting prices for this country is broadly similar to
that of Indonesia. For a discussion of the methodology
and results of this set of prices, see Lal (1978).
the direction of the divergence between actual and shadow wage rates is clear enough, even if the precise magnitude is not.

First, in calculating shadow wage rates, it is necessary to distinguish between different types of labour and different firms. The main reason for the divergence between actual and shadow wage rates is the presence of institutional forces (trade unions, government labour regulations) which push up wages above the social opportunity cost of labour. But these forces usually apply only to unskilled and semi-skilled labour in modern sector firms. Skilled labour, such as accountants and engineers, are in short supply in Indonesia and most other LDCs. These workers receive high wages not because of the existence of institutional pressures but because their skills are in great demand. Similarly, for employees outside the modern sector institutional factors are not important. Thus for both these groups of workers wage rates are scarcity prices which reflect with reasonable accuracy the opportunity cost of labour. We should only adjust wages for non-skilled workers in modern sector firms.

In the Philippines study, shadow wages in urban areas were estimated to be 90 percent of market rates for workers in firms in the unorganised sector, 80 percent for those in the organised 'normal' sector and 90 percent for those in the organised 'elite' sector (Lal, 1978:37). For our study of the Indonesian weaving industry the divergence would certainly be no greater than this, for two reasons. First, the Indonesian labour market is not heavily regulated and institutional factors are generally not of great significance (see Manning, 1979:155-176, 364-374; see also Chapter Five, section 5.4 above). Secondly, wage rates were used to calculate weighted labour : machine ratios for both skilled and non-skilled labour (see section 9.3 above), yet only the wage of the latter type of labour requires adjustment. Thus, a reasonable approximation would be to postulate a shadow wage which is 90 percent of the market wage for M_3 firms, 95 percent for M_2 firms, and identical to the market wage for M_1 and H firms. Hence the 'typical' annual shadow wage for M_3 is (.9)
\[(240,000) = \text{Rp} \quad 216,000 \text{ and that for } M_2 (0.95) (150,000) = \text{Rp} \quad 142,500. \]

The estimation of shadow interest rates is more complicated and, even in the absence of market imperfections, interest rates to borrowers would differ because of differences in the costs of lending. For large-scale public sector investment projects the real rate of interest could be determined with reference to the marginal cost of public sector borrowings from abroad, or the rate of return to private investors in the manufacturing sector; both these criteria represent in some sense the opportunity cost of loan funds. Using the former criterion, Little and Mirrlees (1974:297) concluded:

It would be surprising if the more developed of the developing countries could not achieve a real social rate of return of at least 10 percent; some may find even 15 percent more appropriate. But others ... may well find that they have to set interest rates as low as six to seven percent. It would never be worth going below four to five percent since returns of that order (after allowing for inflation) can be earned, with reasonable security, in the international capital markets to which any country has access.

The most frequent figure used for the real accounting rate of interest in these large, riskless (for the lender, at least) public sector projects is 12 percent per year. At the other extreme, for small firms real unsubsidised interest rates, even in the absence of market distortions, would be considerably higher. The difficulty is to determine how much higher, making allowance for the greater costs associated with lending to smaller firms. One study, based on the findings of credit surveys in several LDCs, concluded that the real rate to small farmers is in the range of 18 to 24 percent, taking

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21 These are average figures and, in practice, the difference between shadow and actual wages would depend on several other factors, the most important being ownership.

22 This is the rate used by Lal (1978:36) for the Philippines.
account of the opportunity cost of capital, default rates and administrative costs (Donald, 1976:112-117). This is probably too high for all but the smallest weaving firms, because, in comparison with small farmers, even small mills would borrow larger amounts and have better collateral to offer. For our purposes the following real shadow interest rates are assumed:

- M₃ 12 percent
- M₂ 14 percent
- M₁ 16 percent
- H 18 percent

9.5.3 The Effect of Shadow Prices

What is the effect on the economic efficiency of the four techniques of using these (admittedly somewhat arbitrary) shadow wage and interest rates? This question can be answered using the same procedure as above. The present value of the annual stream of wages is calculated for each technique using these prices (Table 9.8). It should be noted that because the

<table>
<thead>
<tr>
<th>Technique</th>
<th>Wage/Year (Rp)</th>
<th>Working Life (years)</th>
<th>Interest Rate (%)</th>
<th>P.V. of Wages (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M₃</td>
<td>216,000</td>
<td>30</td>
<td>12</td>
<td>1,739,920</td>
</tr>
<tr>
<td>M₂</td>
<td>142,500</td>
<td>30</td>
<td>14</td>
<td>997,880</td>
</tr>
<tr>
<td>M₁</td>
<td>105,000</td>
<td>30</td>
<td>16</td>
<td>648,606</td>
</tr>
<tr>
<td>H</td>
<td>52,000</td>
<td>25</td>
<td>18</td>
<td>284,279</td>
</tr>
</tbody>
</table>

The rationale for selecting these rates is, first, that the large M₃ firms could be treated in a similar fashion to public sector projects (regarding the cost of lending and the risk of default) and, secondly, that an increment is added the more labour-intensive the technique, reflecting higher administrative costs and greater risk of default. Note however, that if the accounting rate of interest is 12 percent, this would then be the absolute minimum for M₃ firms. Moreover,
techniques are being appraised from the social point of view, the time horizon (and discount period) extends over the full length of the project's life. The present value of annual wages is equivalent to the slope of the iso-cost line, hence the figures in the last column of Table 9.8 become the slopes of the four iso-cost lines drawn onto the original isoquants in Figures 9.2 and 9.3.

It is now possible to determine which techniques are socially optimal. That is, if capital and labour are priced at something approximating their social opportunity cost, which techniques would be adopted by cost-minimising investors? From Figures 9.2 and 9.3 the results are clear: for all techniques except $M_2$, the iso-cost line cuts the isoquant at the point representing the relevant technique, hence only $M_2$ is economically efficient. If the price signals were 'correct', rational private investors would adopt this intermediate technique. Thus the effect of using shadow prices is to considerably alter our results. Technique $M_3$, which is economically efficient at actual factor prices - even if risk-averse investors desire a shortened payback period - is no longer so at these alternative prices. $M_3$ is more competitive the higher the wage rate and the lower the interest rate. Shadow prices, which imply lower wages and higher interest rates for modern-sector firms, render this technique much less competitive. For the two labour-intensive techniques it might be thought surprising that their economic performance does not improve when using shadow prices; indeed hand looms become less attractive. The reason is that wage rates remain unchanged for these techniques, but the range of interest rates is compressed. In the absence of market imperfections, interest rates paid by small firms would decline somewhat, thus rendering the very labour-intensive techniques less competitive. Paradoxically, as we argued in Chapter Six above, a fragmented capital market encourages the continued use of techniques that would otherwise disappear more quickly.

(continued)

the risk of default and the size of the loan are not necessarily inversely related, as was pointed out in Chapter Six.
The results using shadow prices may also be presented in the form of boundary prices. Here the method is, as before, to calculate the range of interest rates for which a technique is economically efficient for a given wage, and vice-versa. Table 9.9 shows the range of interest rates for each technique using a shadow wage. (The boundary interest rates for \( M_1 \) and \( H \) are the same as in Table 9.6 because it is assumed that the shadow and market wages are the same for these techniques.) The main

<table>
<thead>
<tr>
<th>Technique</th>
<th>( M_3 )</th>
<th>( M_2 )</th>
<th>( M_1 )</th>
<th>( H )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( r^{b} ) max</td>
<td>10.8</td>
<td>33.1</td>
<td>65.4</td>
<td></td>
</tr>
<tr>
<td>min</td>
<td>6.2</td>
<td>24.4</td>
<td>32.4</td>
<td></td>
</tr>
</tbody>
</table>

Notes:  
\( a \) Length of project as for Table 9.6  
\( b \) Interest rate for given shadow wage rate. Shadow wages are 216,000 (\( M_3 \)), 142,500 (\( M_2 \)); \( M_1 \) and \( H \), same as actual wage

difference is that at the typical shadow wage, \( M_3 \) is the least-cost technique at interest rates below 11 percent. This finding emphasises once again the importance of reforming the capital market. If loan funds are priced at their social opportunity cost, the most capital-intensive technique would not be economically efficient. \( M_2 \) emerges as economically efficient at an interest rate from six to 33 percent, which encompasses any conceivable social discount rate. The range of boundary wages for a given interest rate may still be read from Table 9.6.

9.6 Choice of Technique in the Production of Sarung

The previous three sections have examined the choice of technique in relation to cambric, and obviously the results are specific to this type of cloth. In this section another type of cloth is chosen for analysis, sarung TC (teteron-cotton). If the results for this cloth are broadly the same as those obtained
for cambric, the force of our earlier conclusions is much greater. In fact, as we shall see, our findings are surprisingly similar for the two types of cloth, the main difference being that hand looms are relatively more competitive in the case of sarung.

The procedures for constructing the isoquant and calculating the iso-cost line are identical to those of cambric, hence our explanations will be brief. The main difference between the two types of cloth is that only three main techniques are used in the production of sarung. Using the notation of the previous section, these are:

- **M₃** imported, fully-automatic looms. Japanese models cost around Rp 3.2 million, the higher price reflecting the more sophisticated equipment required to produce patterned cloth, principally the number of dobbies. The operator: machine ratio is 1:4 per shift.

- **M₂** imported, fully-automatic looms, Japanese models cost about Rp 1.6 million, also more expensive than looms used in the production of cambric. The operator: machine ratio is 1:1 per shift.

- **H** as for cambric.²⁴

### 9.6.1 Construction of the Isoquant

The relevant calculations in the construction of the isoquant are shown in Table 9.10. The first step is to determine value added per sarung for each technique, which is more complicated than in the case of cambric because several additional cost items are included (see part (a)). A number of points may be made regarding the calculation of value added.

---

²⁴ An additional technique that could be included is the locally-made loom (M₁) which has been adapted to produce sarung. Several small mechanised firms were observed using this technique, although the adaptations usually are not successful for weaving sarung. More frequently, they produce kain selimut (blanket) and kain kasur (mattress cover).
Table 9.10: Pre-Isoquant Calculations, Sarung

(a) Calculation of Value Added by Technique (Rp)

<table>
<thead>
<tr>
<th>Item (/kodi)</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Selling Price</td>
<td>21,000</td>
</tr>
<tr>
<td>Expenses:</td>
<td></td>
</tr>
<tr>
<td>Yarn</td>
<td>13,591</td>
</tr>
<tr>
<td>Finishing</td>
<td>1,600</td>
</tr>
<tr>
<td>Packaging</td>
<td>750</td>
</tr>
<tr>
<td>Repairs</td>
<td>150</td>
</tr>
<tr>
<td>Transport</td>
<td>150</td>
</tr>
<tr>
<td>Preparation</td>
<td>600</td>
</tr>
<tr>
<td>Office &amp;</td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td>200</td>
</tr>
<tr>
<td>Electricity</td>
<td>125</td>
</tr>
<tr>
<td>Total</td>
<td>16,841</td>
</tr>
<tr>
<td>Value Added:</td>
<td></td>
</tr>
<tr>
<td>per kodi</td>
<td>4,159</td>
</tr>
<tr>
<td>per 1,000</td>
<td>207,950</td>
</tr>
</tbody>
</table>

(b) Investment Costs per Loom (Rp)

<table>
<thead>
<tr>
<th>Item</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Machinery</td>
<td>10,000</td>
</tr>
<tr>
<td>All Other Fixed</td>
<td></td>
</tr>
<tr>
<td>Capital¹</td>
<td>13,750</td>
</tr>
<tr>
<td>Working Capital¹</td>
<td>114,975</td>
</tr>
<tr>
<td>Total</td>
<td>138,725</td>
</tr>
</tbody>
</table>

Notes:  
a As for cambric (see Table 9.3)  
b Working capital calculated as follows:  
H equivalent to the value of 1.5 month's production  
M₂ " " 2.5 " "  
M₃ " " 4 " "  

Table 9.10: (continued)

(c) Monthly and Annual Output (pieces)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Output/shift</th>
<th>shifts/day</th>
<th>days/week</th>
<th>weeks/year</th>
<th>Total</th>
<th>Average Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>3.5</td>
<td>1</td>
<td>5</td>
<td>50</td>
<td>875</td>
<td>73</td>
</tr>
<tr>
<td>M₂</td>
<td>5.5</td>
<td>3</td>
<td>6</td>
<td>49</td>
<td>4,851</td>
<td>404</td>
</tr>
<tr>
<td>M₃</td>
<td>6.5</td>
<td>3</td>
<td>6</td>
<td>49</td>
<td>5,733</td>
<td>478</td>
</tr>
</tbody>
</table>

per kodi (20 pieces) of sarung. First, most firms purchase their yarn pre-dyed, as very few mills possess their own dyeing unit.²⁵ It is also usual for sarung to be finished outside the factory. Secondly, because sarung - unlike cambric - is a final good sold directly to retailers and traders, there are packaging and sales promotion expenses, although the latter are not substantial. Finally, owing to the fact that it is a final good, the range of sarung prices between techniques is greater than in the case of cambric. Brand-name loyalty and product differentiation are present to a greater degree.

The remaining steps are straightforward. Part (b) presents investment costs per loom for each technique. Land, buildings and other fixed capital are the same as for cambric. However, working capital, again measured in terms of the value of a given number of months' production, is relatively more important. This is because the purchase of yarn pre-dyed necessitates a greater stock of raw materials, and finishing outside the factory results in more working capital in the form of work-in-progress. Part (c) indicates annual output for each technique; capacity utilisation is broadly similar to that of cambric. Finally,

²⁵ A number of smaller firms hand dye the yarn. This is not difficult for cotton yarn, but for synthetic blends - the cloth being considered here - special equipment is needed owing to the higher temperatures required for dyeing.
(weighted) labour: machine ratios are calculated in the same manner as before (see Appendix 9.1.b). 26

Table 9.11 shows the isoquant calculations for each technique. The results are quite similar to that of cambric. First, the range of capital and labour requirements for a given value added (in this case Rp 2.5 million) is considerable: from over Rp 8.7 million of capital and 1.1 units of labour for M₃ to almost Rp 2 million of capital and 15.5 units of labour for H. Secondly, all techniques are technically efficient, since no technique requires more of both inputs to produce a given value added as compared to the two other techniques.

9.6.2 Calculation of Boundary Prices

Once again, to determine which techniques are economically efficient, factor prices must be specified. Rather than draw in various iso-cost lines, as was done in Figures 9.2 and 9.3, boundary prices are calculated for each technique, based on the slope of each segment of the isoquant. These are shown in Table 9.12. Since there are now three techniques, M₂ is the only one for which a maximum and minimum is given for both the wage and interest rate. Also, because M₃ and M₂ machines are purchased new but second-hand hand looms are used, the minimum wage for M₃ corresponds to the maximum for M₂, but this is not the case for M₂ and H. Further, in calculating boundary interest rates, two wages are assumed - an actual wage and a shadow wage, as determined in section 9.5 above.

At existing wage rates, technique M₃ is economically efficient up to an annual real interest rate of 12 percent, whilst M₂ is competitive over a wide range of interest rates. At the 'typical' interest rates assumed above in section 9.4 (6 and 9 percent respectively) both these techniques are

26 Note that hand loom weavers of sarung receive a higher wage (Rp 81,250 per annum) than do cambric weavers because of the greater skill required.
Table 9.11: Isoquant Calculations, Sarung

<table>
<thead>
<tr>
<th>Technique</th>
<th>H</th>
<th>M₂</th>
<th>M₃</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data/unit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Output (pieces)</td>
<td>875</td>
<td>4,851</td>
<td>5,733</td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>138,725</td>
<td>3,056,250</td>
<td>6,115,500</td>
</tr>
<tr>
<td>Labour : Machine</td>
<td>1.13 : 1</td>
<td>1.28 : 1</td>
<td>0.77 : 1</td>
</tr>
</tbody>
</table>

| **Data/1,000 pieces** | | | |
| Investment Costs (Rp) | 158,543 | 630,025 | 1,066,719 |
| Labour (units) | 1.29 | 0.26 | 0.13 |
| Value Added | 207,950 | 263,250 | 306,100 |

| **Data/Rp 2.5 million V.A.** | | | |
| Investment Costs (Rp) | 1,906,021 | 5,983,141 | 8,712,177 |
| Labour (units) | 15.53 | 2.51 | 1.10 |

Isoquant slopes: $M₃ - M₂ = 1,935,487$
$M₂ - H = 313,143$

economically efficient, and remain so even if a shortened time horizon is assumed (the calculations are not shown here). However, $M₂$ is not the least-cost technique at very low real interest rates. Hand looms are more competitive in the production of sarung than cambric (the boundary interest rate is 26 as against 32 percent), which explains why hand weaving of sarung has continued for longer than that of cambric. Nevertheless, this technique is competitive only at interest rates charged in the informal credit market. The use of shadow wage and interest rates affects our conclusions regarding the competitiveness of the mechanised techniques: as was the case in the production of cambric, $M₃$ is no longer economically efficient (at an interest rate of 12 percent), but $M₂$ remains so. Thus $M₂$ also emerges as the socially optimal technique for factory weaving in the production of sarung.
Table 9.12: Boundary Prices, Sarung
(n = 30 years)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/min</td>
<td>12</td>
</tr>
<tr>
<td>M₃</td>
<td>min</td>
<td>240,278</td>
</tr>
<tr>
<td>M₂</td>
<td>max</td>
<td>240,278</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>38,875</td>
</tr>
<tr>
<td>H</td>
<td>max</td>
<td>39,926</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>25.9</td>
</tr>
</tbody>
</table>

Notes:  
  a Length of project as for cambric  
  b Actual and shadow wages as for cambric, except that for H which is Rp 81,250

9.7 Conclusion

Our analysis in this chapter has demonstrated the choice of technology is a very complex field. Comparing the economic performance of different techniques is an extremely laborious task. However, in order to obtain an accurate picture of a given industry, detailed industry-specific information is required. Studies which do not take account of, for example, differences in product quality between techniques and the state of factor markets are quite misleading.

Having presented much information regarding the range of techniques in the Indonesian weaving industry, we can now draw out the main conclusions. First, all techniques are technically efficient for both goods, hence conclusions regarding their economic efficiency can be reached only by specifying wage and interest rates for each technique. Secondly, contrary to the results of several industry case studies in LDCs and the a priori feeling of many observers of Indonesia, at 'typical' factor prices it is quite rational for profit-maximising private investors to adopt the two most capital-intensive techniques, M₃ and M₂. Thirdly, hand looms and, to a lesser extent, simple power looms (technique M₁)
are economically efficient only at higher interest rates. In the production of cambric and sarung, rational investors who have access to formal sector credit would not choose these techniques.

Therefore, for firms in the modern sector, the effective choice is between fully and semi-automatic looms, M₃ and M₂. The former are economically efficient at actual factor prices. However, using shadow prices - and those postulated in section 9.5 are rather conservative - these looms are not socially optimal. By contrast, semi-automatic looms are economically efficient across a wide spectrum of wage and interest rates, and in this sense emerge as the preferred technique.

It might be argued that, since both techniques are mechanised and used by modern sector firms, this is a relatively unimportant finding. This view is mistaken: as we have emphasised throughout the study, the industry is not dualistic in that there is not a sharp cleavage between the hand loom and power loom sectors. Within the power loom sector there is a considerable range of technology in use, and the difference between techniques M₃ and M₂ is substantial. Indeed, so capital-intensive is M₃ that the difference between M₃ and M₂ is greater than that between M₂ and the next technique, M₁. ²⁷

²⁷ Another illustration of the difference between techniques M₃ and M₂ is to consider the effect on aggregate employment in the weaving industry of these two techniques. For example, using production data for 1977/78 and the labour-use ratios given in Table 4.10 it is possible to estimate how many jobs would be required if each technique was the only one in use in the industry. In 1977/78, if all cloth had been produced using fully-automatic looms about 44,500 jobs would have been generated; by contrast, if technique M₂ had been the only technique, 265,000 would have been available. These are approximate figures, but they do indicate the magnitude of the difference between M₃ and M₂.
APPENDIX 9.1
THE CALCULATION OF LABOUR : MACHINE RATIOS

(a) Cambric

H: Assume one supervisor per 30 hand looms; a full-time monthly salary of Rp 10,000 is paid, but since the supervisor works part-time this reduces to Rp 8,000.

\[ Rp \ 8,000 = \frac{8,000}{4,333} = 1.846 \ \text{monthly operator wages.} \]

\[ \therefore \text{30 hand looms have 30 weavers + 1.846 'operators'.} \]

\[ \therefore \text{labour:machine ratio} = \frac{31.846}{30} = \frac{1.06}{1}. \]

M\(_1\): Assume one mandor (foreman) receiving Rp 20,000 per month and one montir (mechanic) receiving Rp 16,000 per month per 20 looms per shift.

= Rp 36,000 per 20 looms per shift per month

= Rp 1,800 per loom per shift per month

Since 1 loom produces ± 412.8 metres per shift per month,

\[ \therefore \text{labour:machine ratio} = \frac{1 + 4.3}{2} \]

\[ = \frac{9}{2} = 1.48:2 \]

\[ = 0.74:1 \]

M\(_2\): Monthly operator wage is Rp 12,500, and operator: machine ratio = 1.4. Assume non-production:production labour ratio is 2:3, and average non-production labour wage is 1.5 times that of production labour.

\[ \therefore \text{per 4 machines, there is 1 operator} \]

and \((1) (2/3) (1.5) = 1 'non-operator'\]

\[ \therefore 2 \text{operators:4 machines} = 0.5:1 \]
M₃: Monthly operator wage is Rp 20,000, and direct operator:machine ratio = 1:32.

Since (i) non-operator production staff are three times the number of direct operators, and receive the same average wage, and

(ii) non-production labour are 2.5 times the number of direct operators, and receive on average Rp 40,000 per month,

then the labour:machine ratio is

\[ 1 + (1 \times 3) + \left[ (1) (2.5) \left( \frac{40,000}{20,000} \right) \right] : 32 \]

\[ = 9:32 \]

\[ = .28:1 \]

(b) Sarung

H: Labour costs per kodi (20 pieces) of sarung:

- weaving = \(75 \times 20 = 1500\)
- packing = 80
- supervisor = \(\frac{12,000}{105} = 114.3\)

Total = \(\frac{1694.3}{1500}\)

* supervising 30 weavers, the output of which = 3.5 kodi \(\times 30 = 105\) kodi, and being paid \(\frac{3}{4}\) (16,000) = Rp 12,000.

∴ labour:machine ratio = \(\frac{1694.3}{1500}\) : 1 = 1.13 : 1

M₂: labour costs per kodi:

- weaving = \(80 \times 20 = 1600\)
- packing = 100
- other = \(\frac{2,433}{7.1} = 343\)

Total = \(\frac{2043}{1600}\)

**Staff Rp 30,000 per 50 looms; foreman Rp 25,000 per 30 looms; mechanic Rp 20,000 per 30 looms

\[ = \frac{30,000}{50} + \frac{25,000}{30} + \frac{20,000}{30} = 2,433\text{ per loom} \]

and each loom produces 7.1 kodi per month per shift.

∴ labour:machine ratio = \(\frac{2043}{1600}\) = 1.28:1
M_3: Operator:machine ratio = 1:4

Since (i) non-operator production staff are three-quarters the number of operators, with same wage, and

(ii) non-production staff are half the number of production staff, with a wage 1.5 times higher,

then labour:machine ratio is

\[ 1 + (1) (0.75) + [(\frac{1}{2}) (1.75) (1.5)] : 4 \]

\[ = 3.063:4 \]

\[ = .77:1 \]
CHAPTER TEN
THE EFFECT OF ALTERNATIVE POLICIES

10.1 Introduction
The previous chapter emphasised that there are two sets of factors which determine the economic efficiency of the four techniques. These are, first, factors which affect the shape of the isoquant, that is, capital and labour requirements to produce a given value added for each technique and, secondly, those which determine the slope of the iso-cost line. Chapter Nine focused on the second set of factors; it examined the sensitivity of the competitiveness of the techniques to changes in wage and interest rates, and the economic life of the projects. The purpose of this chapter is to consider the effect of a range of government policies which influences the shape of the isoquant and thus the economic efficiency of the techniques.

Four policies which were discussed in Chapter Five are introduced. These are pricing of foreign exchange, exemption from the duty on imported capital equipment, prohibition of the import of second-hand looms, and other fiscal incentives offered to investors. For all but the last policy, an attempt is made to measure the impact of changes in these policies on the performance of the techniques. The main conclusion is that $M_2$ again emerges as the socially optimal technique.

Several preliminary remarks may be made regarding our approach. First, calculations are shown only for the production of cambric, but the results are similar for both cambric and sarung. Secondly, the isoquant is not graphed for each case. For the sake of brevity, boundary prices are calculated directly from capital and labour requirements for a given value added. Thirdly, as before, boundary wages are given for three real interest rates (12, 24 and 36 percent) and boundary interest rates for typical actual and shadow annual wages.
10.2 The Exchange Rate

In Chapter Five (section 5.4) it was pointed out that from August 1971 to November 1978 the rupiah was tied to the U.S. dollar, yet Indonesia's rate of inflation was significantly above that of its major trading partners. Usually such circumstances would lead to a devaluation of the rupiah, but this did not occur until 1978 because of the massive turnabout in Indonesia's balance of payments position following the oil boom of 1973-74. In the weaving industry, owing to the strong correlation that exists between the capital intensity and import intensity of the major techniques, the maintenance of a fixed rate adversely affected the competitiveness of the more labour-intensive techniques. Large, capital-intensive firms were able to buy imported machinery at a cheaper rupiah price than would have been the case in the absence of the export boom.

The purpose of this section is to consider the effects of a devaluation of the rupiah on the economic efficiency of the four techniques. Two points should be noted. First, it is not argued that a devaluation should have occurred; indeed, had the rupiah been permitted to float freely, it almost certainly would have drifted upwards in the mid 1970s (i.e. a revaluation). Rather, an alternative exchange rate is introduced to demonstrate the effect on labour-intensive techniques of structural changes in the economy associated with the dramatic rise in oil revenue. Our findings do no more than strengthen the case for some sort of structural adjustment assistance to ease the difficulty of transition in the industry. Secondly, we are not attempting to predict the effect of the 1978 devaluation. The basic calculations were completed before November 1978, the alternative rate (Rp 630 = $US 1) being calculated on the basis of annual average price changes in Indonesia's major trading partners, weighted according to their share of the trade. Coincidentally, this rate is almost identical to the actual post-devaluation rate (Rp 625 = $US 1).
Calculation of the effect of the devaluation on machine prices is a straightforward matter (see Appendix 10.1). It should be emphasised however, that our approach is necessarily partial: in practice a devaluation sets in train a whole series of price rises for many goods and services throughout the economy, in addition to imported machinery. By assuming the former to be constant, we are in fact considering the case of a "fully effective" devaluation, that is, of no increase in the price of non-traded goods. This might be regarded as a border case, the actual outcome being closer to the "no devaluation" case the more the prices of non-traded goods rise and erode the effects of the devaluation. Much depends on the time period to which the analysis relates, because the effect of a devaluation on the ratio of the price of traded to non-traded goods is usually greatest immediately after the devaluation; the longer the period afterwards, the less marked is the effect (Kingston, 1979:2-8). Note however, that our analysis does not assume prices remain constant, but rather that value added (per metre) does not change.

Isoquant calculations at the new exchange rate are shown in Table 10.1. Because a fully effective devaluation is assumed, the only figure to change for the mechanised techniques (data for hand looms are unchanged - see Table 9.4) is investment costs, which increase because looms are now more expensive. Investment costs do not increase by the full extent of the devaluation however, because initially only the c.i.f. component of the price is affected, and the price of other items of capital is assumed to remain constant. Rather than construct an isoquant and iso-cost line, as in Chapter Nine, we proceed directly to estimating boundary prices, which are given in Table 10.2. Boundary wage levels are given for three interest rates, whilst interest rates are calculated for shadow and actual wage rates.

What is the effect of the devaluation on the competitiveness of the four techniques? This question may be answered by
## Table 10.1: Isoquant Calculations, Devaluation

<table>
<thead>
<tr>
<th>Technique</th>
<th>$M_1$</th>
<th>$M_2$</th>
<th>$M_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data/Unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Output (m)</td>
<td>9,408</td>
<td>19,404</td>
<td>24,696</td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>863,061</td>
<td>2,941,825</td>
<td>4,833,964</td>
</tr>
<tr>
<td>Labour : Machine</td>
<td>0.74:1</td>
<td>0.5:1</td>
<td>0.28:1</td>
</tr>
<tr>
<td>Data/10,000 metres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>917,369</td>
<td>1,516,092</td>
<td>1,957,387</td>
</tr>
<tr>
<td>Labour (units)</td>
<td>0.787</td>
<td>0.258</td>
<td>0.113</td>
</tr>
<tr>
<td>Value Added (Rp)</td>
<td>368,800</td>
<td>412,400</td>
<td>431,500</td>
</tr>
<tr>
<td>Data/Rp 3 million V.A.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td>7,462,329</td>
<td>11,028,797</td>
<td>13,608,719</td>
</tr>
<tr>
<td>Labour (units)</td>
<td>6.40</td>
<td>1.88</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Isoquant Slopes: $M_3 - M_2 = 2,367,083$
$M_2 - M_1 = 789,042$
$M_1 - M = 181,516$

The adoption of technology $M_3$ would still not be rational (at the 12 percent interest rate). The only change is that in Table 7.47, the devaluation has a substantial effect on the competitiveness of the most capital-intensive technique. Whereas previously, $M_1$ was economically efficient at an interest rate of 12 percent and actual annual wages are used, in either case, $M_1$ is not the least-cost technique at interest rates above 12 percent. Nevertheless, unless a very rapid increase
Table 10.2: Boundary Prices, Devaluation

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/ min 12 24 36</td>
<td>max/ min Actual Shadow</td>
</tr>
<tr>
<td>M₃</td>
<td>min 293,858 568,996 852,234</td>
<td>max 9.5 8.3</td>
</tr>
<tr>
<td></td>
<td>max 293,858 568,996 852,234</td>
<td>min 18.9 17.9</td>
</tr>
<tr>
<td>M₂</td>
<td>min 97,955 189,669 284,083</td>
<td>max 4.8 4.3</td>
</tr>
<tr>
<td></td>
<td>min 97,955 189,669 284,083</td>
<td>min 57.9 57.9</td>
</tr>
<tr>
<td>M₁</td>
<td>min 22,534 43,633 65,352</td>
<td>min 13.0 13.0</td>
</tr>
<tr>
<td>H</td>
<td>max 23,143 43,766 65,376</td>
<td>min 28.6 28.6</td>
</tr>
</tbody>
</table>

Note: a Actual and shadow wages as for Tables 9.6 and 9.9

considering, first, whether it would be economically rational for investors to adopt these techniques at the actual factor prices specified in Chapter Nine (see Table 9.5) and, secondly, how the post-devaluation data in Table 10.2 compare with those of the pre-devaluation case (Tables 9.6 and 9.9). On the first, the results differ very little: owing to the fragmented nature of factor markets, all three mechanised techniques are economically efficient at the prices which we suggest are typical for firms employing these techniques. The adoption of technique H would still not be rational (at the interest rate of 24 percent), hence the only change is that M₁ is economically efficient (at a 15 percent interest rate) whereas previously it was not. Comparison of the boundary prices however, indicates a devaluation has a substantial effect on the competitiveness of the most capital-intensive technique. Whereas previously M₃ was economically efficient at an interest rate of 12 percent and actual wages (the maximum interest rate consistent with a tangency solution was in fact 12.1 percent; see Table 9.6), it is now irrelevant whether actual or shadow annual wages are used. In either case, M₃ is not the least-cost technique at interest rates above 9.5 percent, and would not become so unless a very rapid increase...
in real wages was anticipated. By contrast, at either the actual or shadow wage levels assumed, the choice of $M_2$ is rational for almost the entire range of interest rates charged in the formal banking sector.

An indication of the effect of the devaluation in enhancing the competitiveness of more labour-intensive techniques is that at shadow prices in the "no devaluation" case (see Table 9.8) only $M_2$ is economically efficient. At the new exchange rate however, both $M_2$ and $M_1$, at the assumed wage levels, are economically efficient. The improvement in the performance of hand looms is marginal, and this technique would not be adopted at interest rates much below 30 percent.

10.3 A Duty on Imported Equipment

The imposition of a duty on imported capital equipment - exemption from which is granted to firms as part of the government's investment incentives - can be considered more briefly. The justification for such a policy is that in the presence (in 1977) of a general import duty, a bias towards capital intensity is created by exempting machinery from this levy. This section considers the effect of the imposition of a 20 percent levy on imported machinery. It will be recalled from our discussion of taxation procedures in Indonesia (Chapter Five, section 5.4) however, that in practice it is unlikely firms would pay the full levy, owing to the existence of widespread taxation evasion.

The case of a duty on imported machinery differs from that of a devaluation in two respects. First, the economic arguments for the imposition of a duty in Indonesia are much stronger; the effect of an alternative exchange rate was calculated only to demonstrate the extent to which the labour-intensive techniques had been disadvantaged by the shift in Indonesia's comparative advantage in the 1970s. Secondly, the effect of the imposition of a duty can be predicted with greater accuracy. Unlike the partial analysis in the case of a devaluation, the levying of a duty would have only a minimal effect on other prices and wages.
Estimation of investment costs follows the same procedures as that of devaluation: for the two imported techniques, M₃ and M₂, the c.i.f. prices rise by 20 percent, whilst the price of M₁ looms rises by a smaller percentage. Isoquant calculations and boundary prices are presented in Tables 10.3 and 10.4.

The effects of this policy are unambiguous. As in the 'actual prices' case (Table 9.5), techniques M₃ and M₂ are economically efficient. However, at the shadow prices assumed (Table 9.8), only M₂ would be adopted by profit-maximising investors. Even assuming actual wages (Rp 240,000) - let alone shadow wages - M₃ is not economically efficient at the shadow interest rate of 12 percent. If a duty is imposed the competitiveness of labour-intensive techniques, M₁ and H, also improves but neither would be adopted by economically rational investors at the factor prices assumed. For M₁ the minimum interest rate is 19.4 percent, whilst that for H is 30 percent.

10.4 Prohibition of the Import of Used Machinery

Estimating the effects of the government's decision to ban the import of second-hand looms (see Appendix 5.1) is more difficult because there are no ruling world prices for different types of second-hand looms. As the only detailed examination of the international trade in used machinery has shown, much depends on the business experience and contacts of the LDC entrepreneur who is planning the purchase of such machinery (Cooper and Kaplinsky, 1974). Hence, in contrast to new machinery, the price of which is usually fixed (although terms of payment are negotiable), second-hand prices are likely to fluctuate considerably.

One solution to the problem of estimating the price of second-hand looms would be to follow the approach of Pack (1978) and introduce as an additional variable the second-hand price as a percentage of the new price. This has the disadvantage however, of making our calculations and data presentation more cumbersome, because three sets of boundary
Table 10.3: Isoquant Calculations, Import Duty

<table>
<thead>
<tr>
<th>Data/Unit</th>
<th>Technique</th>
<th>M₁</th>
<th>M₂</th>
<th>M₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Output (m)</td>
<td></td>
<td>9,408</td>
<td>19,404</td>
<td>24,696</td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td></td>
<td>834,357</td>
<td>2,574,451</td>
<td>4,237,578</td>
</tr>
<tr>
<td>Labour : Machine</td>
<td></td>
<td>0.74:1</td>
<td>0.5:1</td>
<td>0.28:1</td>
</tr>
<tr>
<td>Data/10,000 metres</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td></td>
<td>886,859</td>
<td>1,326,763</td>
<td>1,715,897</td>
</tr>
<tr>
<td>Labour (units)</td>
<td></td>
<td>0.787</td>
<td>0.258</td>
<td>0.113</td>
</tr>
<tr>
<td>Value Added (Rp)</td>
<td></td>
<td>368,800</td>
<td>412,400</td>
<td>431,500</td>
</tr>
<tr>
<td>Data/Rp 3 million V.A.</td>
<td></td>
<td>7,214,146</td>
<td>9,651,526</td>
<td>11,929,756</td>
</tr>
<tr>
<td>Labour (units)</td>
<td></td>
<td>6.40</td>
<td>1.88</td>
<td>0.79</td>
</tr>
<tr>
<td>Isoquant Slopes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₃ - M₂</td>
<td></td>
<td>2,090,119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₂ - M₁</td>
<td></td>
<td>539,243</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M₁ - H</td>
<td></td>
<td>173,114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10.4: Boundary Prices, Import Duty

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/ min</td>
<td>12</td>
</tr>
<tr>
<td>M₃</td>
<td>min</td>
<td>259,475</td>
</tr>
<tr>
<td>M₂</td>
<td>max</td>
<td>259,475</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>66,944</td>
</tr>
<tr>
<td>M₁</td>
<td>max</td>
<td>66,944</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>21,491</td>
</tr>
<tr>
<td>H</td>
<td>max</td>
<td>22,072</td>
</tr>
</tbody>
</table>
prices would then be necessary. In any case, considerable information is available regarding the market for second-hand looms. On the basis of discussions during fieldwork with Japanese and Indonesian weavers knowledgeable of this market, correspondence with North American firms specialising in this trade, and reference to magazine advertisements, prices may be estimated with some accuracy. Bearing in mind that the price data are only approximate, the simplest approach is to adopt guesstimates for each technique. The fundamental principle is that for each technique, the second-hand price (expressed as a percentage of the new price) is lower the more labour-intensive the technique: non-automatic looms in countries with real wages higher than in Indonesia become economically obsolete faster than do fully-automatic looms.

Accordingly, it would not be unreasonable to assume that second-hand $M_3$ looms are two-thirds the price of new looms, whilst for $M_2$ looms the figure is one-half. $M_1$ looms are domestically manufactured, hence it is necessary to estimate the second-hand price of such looms produced overseas (mainly India and China). $\$US$ 400 may be taken as an informed guess. These are for looms in good condition and about five years old. It should be emphasised that no great reliance can be placed on the precision of these estimates, but they are reasonably accurate. Note that the 'non c.i.f.' component of loom prices remains similar to that of new looms. That is, the cost of transport, docking, installation and the provision of a set of spare parts is not reduced by the adoption of

1 That is, a range of second-hand prices and interest rates for a given wage, wage and interest rates for given second-hand prices, and wage and second-hand prices for a given interest rate.

2 Except for certain special products, non-automatic looms are a rarity in developed countries, and becoming less common in semi-developed countries such as South Korea, Taiwan and the city states of Asia. Hence, buyers of these looms are mostly from low-wage countries such as Indonesia.
second-hand machinery. This is frequently overlooked by those advocating the use of such machinery in LDCs.

Isoquant calculations and boundary prices are presented in Tables 10.5 and 10.6. The results are similar to the case where an import duty is imposed. M₃ is not economically efficient at shadow prices, but at very low real interest rates economically rational investors would adopt this technique. A similar result to the import duty case also applies for techniques M₁ and H, since the minimum interest rate for each technique is well above either the actual or the shadow rate. Here again, M₂ emerges as the preferred technique for a wide range of wage and interest rates.

At first sight, these results may appear surprising. Compared to the 'no change' case (Table 9.6 using actual wages, Table 9.9 using shadow wages), the use of second-hand looms improves the competitiveness of M₂ compared to the other techniques, even though the three mechanised techniques now require less capital to produce a given value added than before (comparing Tables 9.4 and 10.5). Why is this so? The explanation appears to be as follows: First, in the case of hand looms, the answer is obvious. The technique with which it is competing (M₁) is now more efficient, hence causing hand looms to be less attractive. In spite of government statements emphasising how primitive hand looms are, prohibiting the import of used looms has the unintended effect of making hand looms more competitive. Secondly, the economic performance of M₁ becomes marginally worse (as measured by the minimum interest rate) because it does not match the improvement in the performance of M₂. Although these simple power looms can be obtained very cheaply overseas, the 'non c.i.f.' component of the price remains substantially unaltered. This is the main reason why M₁ does not become more attractive. Finally, M₃ becomes less attractive in comparison with M₂, owing to the fact that economic obsolescence is not as rapid, hence the price falls less sharply. Thus M₂ is the preferred technique: not M₁ because other costs 'swamp' the effect of lowering the c.i.f.
### Table 10.5: Isoquant Calculations, Used Machinery

<table>
<thead>
<tr>
<th>Data/Unit</th>
<th>Technique</th>
<th>M₁</th>
<th>M₂</th>
<th>M₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Output (m)</td>
<td></td>
<td>8,624</td>
<td>16,979</td>
<td>21,830</td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td></td>
<td>612,490</td>
<td>1,765,951</td>
<td>3,237,578</td>
</tr>
<tr>
<td>Labour: Machine (units)</td>
<td></td>
<td>0.74:1</td>
<td>0.5:1</td>
<td>0.28:1</td>
</tr>
<tr>
<td>Data/10,000 metres</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td></td>
<td>710,216</td>
<td>1,040,080</td>
<td>1,483,087</td>
</tr>
<tr>
<td>Labour (units)</td>
<td></td>
<td>0.858</td>
<td>0.295</td>
<td>0.128</td>
</tr>
<tr>
<td>Value Added (Rp)</td>
<td></td>
<td>368,800</td>
<td>402,400</td>
<td>421,500</td>
</tr>
<tr>
<td>Data/Rp 3 million V.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs (Rp)</td>
<td></td>
<td>5,777,243</td>
<td>7,754,072</td>
<td>10,555,776</td>
</tr>
<tr>
<td>Labour (units)</td>
<td></td>
<td>6.98</td>
<td>2.20</td>
<td>0.91</td>
</tr>
</tbody>
</table>

**Isoquant Slopes:**
- M₃ - M₂ = 2,171,864
- M₂ - M₁ = 413,563
- M₁ - H = 126,964

### Table 10.6: Boundary Prices, Used Machinery

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual Wage for Given r (%)</th>
<th>r for Given Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max/ min 12 24 36</td>
<td>max/ min Actual</td>
</tr>
<tr>
<td>M₃</td>
<td>min 276,913 523,666 782,230</td>
<td>max 10.0 8.7</td>
</tr>
<tr>
<td>M₂</td>
<td>max 276,913 523,666 782,230</td>
<td>max 36.3 34.4</td>
</tr>
<tr>
<td></td>
<td>min 52,729 99,716 148,951</td>
<td>min 4.7 4.2</td>
</tr>
<tr>
<td>M₁</td>
<td>max 52,729 99,716 148,951</td>
<td>max 82.7 82.7</td>
</tr>
<tr>
<td></td>
<td>min 16,188 30,613 45,728</td>
<td>min 25.3 25.3</td>
</tr>
<tr>
<td>H</td>
<td>max 16,188 30,613 45,728</td>
<td>min 41.0 41.0</td>
</tr>
</tbody>
</table>
price of the loom; not M₃ because loom prices still remain relatively high.

It might be noted in passing that second hand looms are competitive with new looms for all the mechanised techniques (calculations are not presented here). For M₃ the improvement is only marginal, indicating that firms using these looms do not suffer greatly as a result of the prohibition.³ Similarly, the improvement for M₁ looms, whilst greater, is not substantial. The main beneficiary of the liberalisation would be firms which use M₂ looms.

10.5 Additional Modifications

Several additional variables could be introduced into the analysis and their effect on the competitiveness of each technique considered. One possibility is to incorporate the effect of the fiscal incentives offered to investors. As was pointed out in Chapter Five (section 5.4), despite some qualifications regarding the effect of accelerated depreciation allowances and the existence of widespread taxation evasion, there is little doubt that the overall impact of these concessions is to generate a bias towards capital intensity. In practice however, it is very difficult to quantify their precise impact. To overcome this problem, several writers (eg. Pack, 1978:312) have suggested that a proxy measure is to assume a higher (shadow) interest rate for the more capital-intensive techniques as a corrective for the effect these concessions have in cheapening the cost of capital. According to this approach, a small increment would be added to the shadow interest rates assumed in Chapter Nine for each technique (12 percent for M₃, etc). For example, two percent might be added for M₃ (becoming 14 percent), one percent for M₂ (to become 15 percent), and no change for M₁ and H. Boundary shadow wage rates would be calculated as before. In fact, this modification has no

³ Indeed these firms benefit from the ban, because one of its effects is to inflate the price of second-hand looms.
effect on our main conclusions, merely confirming the superiority of technique $M_2$.

Also, the results do display some sensitivity to scale (calculations are not shown here). That is, if less intensive use of capital equipment is assumed the more capital-intensive techniques become less competitive. This accords with the findings of several African studies quoted in Chapter Eight (section 9.5.2). However, there is little point in such calculations because capital-intensive plants are established only on the premise of intensive use.

10.6 Conclusion

The effect of the alternative policies is to reduce the competitiveness of the most capital-intensive technique, $M_3$. At the very low real interest rate of six percent, $M_3$ remains rational for profit-maximising investors although, in contrast to our findings in Chapter Nine, $M_3$ would not be rational if a shortened time horizon is assumed (calculations are not presented in this case). A devaluation or imposition of a duty on imported machinery improves the economic performance of the two labour-intensive techniques, $M_1$ and $H$. $M_1$ is economically efficient in the case of a devaluation of 50 percent, but only if the devaluation is fully effective. If the import of used machinery is permitted — which is by far the most sensible policy reform — only $M_2$ is economically efficient at realistic shadow prices. In fact $M_2$ emerges as the only technique which is economically efficient at shadow factor prices and for all policy regimes. In this sense, it is the preferred technique for weaving mills in Indonesia with access to the organised credit sector.
APPENDIX 10.1

ESTIMATING MACHINERY PRICES

1. Devaluation

A devaluation of the exchange rate raises the rupiah price of machinery. On the assumption of a fully effective devaluation, the c.i.f. price - which constitutes about 75 percent of the installed price for techniques M₂ and M₃ - increases, but the 'non-c.i.f.' component remains unaffected. Note that for each policy 'machinery' refers to looms and 'other' fixed capital for techniques M₃ and M₂. The price of M₃ looms was Rp 1,875,000 (c.i.f. price) + 625,000 = Rp 2,500,000.

assuming an exchange rate of Rp 630 = $US 1, the new price would be

\[(1,875,000) \times \frac{630}{415} + 625,000 = Rp 3,471,386\]

Similarly, M₂ looms were Rp 1,155,000 + 385,000 = Rp 1,540,000.

Their new price would be

\[(1,155,000) \times \frac{630}{415} + 385,000 = Rp 2,138,374\]

For M₁, the situation is more complex because the composition of tradeable components in its manufacture is not known. Clearly, they would be a substantial proportion of total costs. Here we assume 60 percent, in which case 60 percent of the effect of the devaluation \([415 + (0.6)(630 - 415) = 544]\) is passed on. Allowing for domestic distribution and installation costs (unaltered) of Rp 40,000, the new price is 360,000 \(\times \frac{544}{415}\) + 40,000 = Rp 471,904.

The price of hand looms is assumed to be unchanged. These looms are bought second-hand; they are in sufficient supply to ensure that if the technique becomes more competitive as a result of the devaluation their price will not rise. Thus we are assuming their supply curve is for all practical purposes horizontal at Rp 10,000.
2. **Imposition of a Duty on Imported Machinery**

Estimation of the effect of a 20 percent import duty on machinery prices follows a similar procedure. For M₃ and M₂ machines, the effect is only on the c.i.f. component of the price; for M₁, the calculation is based on the assumption that tradeable components form 60 percent of total costs; the price of hand looms is again assumed to be unaltered. Thus, new machine prices are as follows:

- M₃: \((1,875,000)(1.2) + 625,000\) = Rp 2,875,000
- M₂: \((1,155,000)(1.2) + 385,000\) = Rp 1,771,000
- M₁: \((360,000)(1.12) + 40,000\) = Rp 443,200

3. **The Import of Second-hand Machinery Permitted**

Whilst difficult to estimate precisely, it is assumed that the c.i.f. price of second-hand M₃ looms in good condition is two-thirds that of the new price; for M₂ looms it is assumed to be one-half; whilst the c.i.f. price for M₁ looms is assumed to be US 400. 'Non-c.i.f.' costs remain the same. Hence the prices are as follows:

- M₃: \((2/3)(1,875,000) + 625,000\) = Rp 1,875,000
- M₂: \((1/2)(1,155,000) + 385,000\) = Rp 962,500
- M₁: \((400)(415)(4/3)\) = Rp 221,333

In addition to the direct effects on investment costs and the economic life of the project, the use of second-hand looms also affects running costs and annual output. The study by Cooper and Kaplinsky (1974) emphasised that the performance of imported used machinery usually does not match that of equivalent machinery imported new, owing primarily to technicians' unfamiliarity with this machinery. Repair and maintenance costs are also likely to be higher for the more "quality-conscious" capital-intensive firms. Hence adjustments

---

4 M₁ is now imported, in which case we assume that the c.i.f. price is 75 percent of the total. Hence the c.i.f. price is multiplied by \((4/3)\).
are made to the annual output and value added of the mechanised techniques (see Table 10.5.).

4. Investment Costs per Loom under Alternative Policy Regimes

Investment costs per loom are presented in Table 10.7. Those for technique H remain unchanged and thus are not presented.

Table 10.7: Investment Costs per Loom under Alternative Policies

<table>
<thead>
<tr>
<th>Policy</th>
<th>Technique</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devaluation</td>
<td>863,061</td>
<td>2,941,825</td>
<td>4,833,964</td>
<td></td>
</tr>
<tr>
<td>Import Duty</td>
<td>834,357</td>
<td>2,574,451</td>
<td>4,237,578</td>
<td></td>
</tr>
<tr>
<td>Used Machinery</td>
<td>612,490</td>
<td>1,765,951</td>
<td>3,237,578</td>
<td></td>
</tr>
</tbody>
</table>

To allow for less intensive use, mechanised mills using second-hand looms are assumed to operate for 5.5 days per week, and production of M3 and M2 techniques per shift - which are more sensitive to the effects of interruptions to production - falls by 1 metre per shift. Running costs are also increased, by Rp 1 per metre.
11.1 Conclusion

The past 12 years have witnessed a thoroughgoing transformation of the Indonesian weaving industry. Until the mid 1960s traditional labour-intensive techniques dominated the industry, in particular the improved hand loom (ATBM) which had been developed in the 1920s. Private investors were neither able nor inclined to adopt mechanised technology on a wide scale. Since the late 1960s, the changed political and commercial climate has ushered in a virtual technological revolution in the industry. The hand loom sector has shrunk, and has been replaced by more capital-intensive techniques, although the industry still remains relatively labour-intensive compared to many other industries. The purpose of this thesis has been to document recent changes in the industry and examine the economic performance of the main techniques employed: Is hand loom weaving no longer viable, even in low-wage, labour-abundant economies such as Java? Are fully-automatic looms an inappropriate technology in Indonesia, in use only because of policy biases which distort relative factor prices and encourage the adoption of excessively capital-intensive techniques? Would one of the intermediate (mechanised) techniques be more appropriate for firms in the modern sector? The aim of the latter part of the thesis has been to develop a framework which enables these questions to be answered.

Two principal conclusions emerge from our analysis - one 'optimistic' and one 'pessimistic'. The optimistic conclusion is that weaving is an industry in which a range of technically efficient techniques exist, and are available to weaving mills. 'Technological pessimism, a characteristic of much of the literature on choice of technology in LDCs, does not apply to the Indonesian weaving industry. It is not necessary to undertake a huge investment in research and development programs to develop techniques suited to Indonesia's
factor endowments. The existing 'technological shelf' is satisfactory because it contains a sufficient range of techniques. Consequently, in the selection of techniques, relative factor prices do matter. There is every reason to presume that a change in the wage-interest ratio will affect the technology adopted by entrepreneurs. The importance of relative factor prices however, leads to our pessimistic conclusion: It is the government's responsibility to establish a climate which is conducive to the use of appropriate techniques and to 'get prices right'. Whether this is likely in Indonesia is a moot point. The vested interests opposed to the substantial liberalisation and reforms discussed in the following section are formidable. Yet our purpose is not primarily to discuss how the reforms might be effected, but what reforms are suggested by an economic analysis of the present set of policies and of some alternative policy regimes.

A central theme of this study has been the need for a detailed disaggregated approach. Alternative hypotheses regarding the choice of technology can be tested only on an industry and country-specific basis. For micro studies such as this, therefore, it is essential that the nature of the industry, the technology, the factor markets and government policies be understood. Equally important, it is essential that choice of technique studies have a solid empirical foundation. As the last three chapters demonstrated, studies which do not pay attention to detail may produce quite mistaken conclusions.

In the earlier chapters of the thesis we examined the nature of the weaving industry in LDCs and analysed developments in the Indonesian weaving industry in some detail. Chapter Two focused on the role of the industry in LDCs in the context of the broader discussion about employment and industrialisation. Developments in the industry in India (after 1950) and Japan (before 1955) and the implications for the Indonesian industry were considered briefly. Chapters Three and Four outlined the history and current structure of
the Indonesian weaving industry, paying particular attention to changes in the industry after 1966.

The next three chapters examined the present government's industrial policies as they affect the weaving industry, and the nature of factor markets faced by firms in the industry. Although the industry remains predominantly privately-owned, government intervention and regulation is ubiquitous. It is impossible to meaningfully analyse the industry without discussing the role of government bodies. Reform of government policies is the key to encouraging the adoption of less capital-intensive techniques in the industry. It is also necessary to have some understanding of the nature of the labour and capital markets (Chapters Six and Seven). The assumption that the wage-interest ratio is invariant with respect to the technique in use, which is made in many choice of technique studies, is wholly unrealistic. The use of this assumption reflects an inadequate appreciation of the actual conditions in which the technology is adopted. Indonesia, like most other LDCs, is characterised by fragmented factor markets. Much of this fragmentation is the result of government policies, particularly in the capital market. Cheap credit programs have been instituted, such that real interest rates are far below the social opportunity cost of investment funds. Nevertheless, government policies are not the only cause of this fragmentation, nor is the Indonesian government a worse offender than those of many other LDCs and developed countries.

Chapters Eight to Ten constituted the analytical core of the thesis. Chapter Eight provided a rationale for the use of neo-classical tools of analysis, modified so as to better reflect real world conditions. The main conclusion was to emphasise the importance of market structure: so long as competitive pressures are strong, private investors are likely to adopt least-cost techniques. In Chapters Nine and Ten three sets of variables were introduced - the type of cloth produced, factor prices, and some alternative policies. In each case their effects on the economic performance of the techniques were
considered. Specifically, the analysis was conducted for two types of cloth (cambric and sarung), actual and shadow factor prices (in the case of the former the concept of a shortened time horizon was introduced), and a range of government policies. Our major conclusions may be restated as follows:

(i) All techniques are technically efficient, for both goods and all policy regimes. Hence, which technique is preferred depends on the specification of relative factor prices.

(ii) At actual (1977) prices and operating conditions, the two most capital-intensive techniques are economically efficient. Private investors would be economically rational in adopting these techniques. The two more labour-intensive techniques would not be adopted unless interest rates were high - equivalent to those charged in the unorganised money market - or wages were significantly below those assumed to be 'typical' for each technique.

(iii) Our data suggest that most desirable policy reforms would have the effect of rendering the most capital-intensive technique ($M_3$) economically inefficient. These reforms include the raising of real interest rates to a level approximating the social opportunity cost of loan funds, permission to import used machinery, and reform of the system of investment concessions in such a way that they have a neutral effect on the choice of technology.

(iv) $M_2$, an intermediate, mechanised technique emerges as the socially optimal technique for the factory weaving sector in Indonesia. Owing to the competitive nature of the industry, there is no reason to presume that appropriate pricing policies and other reforms would not lead to widespread adoption of this technique. In this
respect, our conclusion is similar to that of Rhee and Westphal (1977) in their study of the industry in South Korea in the early 1970s (see the quotation on page 258 above). Real wages would have to rise very rapidly to alter our conclusion—by as much as one-half in some instances. Drawing on the detailed research of Manning (1979), we have argued that an increase of this magnitude is most unlikely in the immediate future. Owing to the rapid industrialisation in Indonesia during the last decade, substantial industrial sector wage differentials have emerged. As the pace of industrialisation slows down and shortages in the supply of suitable workers is overcome, these differentials might be expected to narrow.

Nevertheless, the conclusion that $M_2$ is socially optimal does not mean that the adoption of appropriate government policies would result in the disappearance of all other techniques: factor market segmentation is deeply entrenched in Indonesia, thus the continued presence of high-interest informal sector credit sources would maintain the hand loom sector; institutional pressures on foreign firms might still be such as to encourage them to adopt technique $M_3$. In a country as diverse as Indonesia, all that could be expected from policy reforms would be a move towards greater homogeneity in the industrial structure.

Our results suggest that labour-intensive technologies have a limited role in the field of mass production textiles. Increasingly, hand loom firms are being pushed out of cambric, sarung and plain and patterned cloth for shirts, trousers and other garments. There are some types of cloth which, by
virtue of their production process and the market they serve, are better suited to hand looms. However, these types of cloth are produced in only small quantity, and demand for them is declining. The main exception is high quality handicraft cloth. As we saw in Chapter Four, there is much scope for the promotion of this sector of the hand loom industry.

(vi) To emphasise once again, our conclusions suggest that relative factor prices do matter. Alternative more appropriate techniques are available. Their more extensive adoption is being hindered by inappropriate government policies.

11.2 Implications

Given that we have placed great emphasis on the importance of a disaggregated approach to choice of technique studies in LDCs, naturally our conclusions must be seen as specific to the Indonesian weaving industry. Nevertheless, our study does have important implications for choice of technique studies in LDCs, and for the coexistence of different techniques in LDC manufacturing industries. The purpose of this section is to briefly examine these implications.

Our work supports the general conclusion of many choice of technique studies that there is considerable scope for the adoption of efficient, relatively labour-intensive techniques of production in the modern manufacturing sector of LDCs. We have however, been critical of the failure of some choice of technique studies to appreciate the importance of the 'institutional setting', and the tendency to ignore important points of detail in the analysis. For economists examining the scope for the adoption of appropriate technology in LDCs, what issues emerge from our study as being important?

(i) Range of techniques. It is important first to identify that a range of techniques does exist. If
the range is limited, there may be scope for technological adaptation, for the establishment of a domestic capital goods industry, or the transfer of technology from other LDCs. However, we are sceptical about the scope for establishing capital goods industries on a wide scale in LDCs like Indonesia which have a small industrial base. Moreover, in evaluating alternative techniques in use overseas, it is necessary to take into account the likely performance in the local environment.

(ii) Range of products. It is necessary to ascertain to what extent the products of different techniques are substitutable. If in fact different techniques produce 'different' products (e.g. patterned v/s plain cloth), or similar products of such different quality that distinct markets are catered for, the effective range of techniques is restricted. If substantial quality differences are found, it is also necessary to ascertain whether or not they are primarily due to technological factors.

(iii) Market structure. The importance of market structure as a determinant of firm behaviour has been emphasised. It is therefore necessary to obtain information on the degree of buyer and seller concentration, the presence of product differentiation, the importance of barriers to entry, and government policies which affect market structure.

(iv) Factor markets. The assumption that relative factor prices are the same for all techniques is quite misleading. Information must be collected on typical wage and interest rates for firms adopting each technique. This requires an analysis of the nature, degree and causes of factor market segmentation.
Ownership. Ownership may be a factor influencing entrepreneurial behaviour. Objectives may differ among firms in the traditional sector, government firms and foreign firms. (However, ownership was not found to be an important factor in the case of the Indonesian weaving industry.)

The attitude of the bureaucracy towards reform. It is essential that the attitudes of government officials towards liberalisation be understood. In the heavily regulated business climate of many LDCs, proposals which advocate a greater reliance on market forces will have little impact.

These factors are of considerable relevance to a discussion of policy options to promote the use of more labour-intensive techniques. They emphasise that for many industries, a policy of 'getting prices right' is a necessary but not sufficient pre-requisite for achieving reform. In this respect the Indonesian weaving industry differs from many other LDC industries; appropriate pricing policies are the key to reform.

Our study also has implications for the coexistence of a range of techniques and firms in a given industry. Coexistence is an important issue because a wide range of techniques would not be expected if product and factor markets were perfectly competitive. We have emphasised the technological diversity of the Indonesian weaving industry. What factors explain the continued existence of a wide range of techniques? We have discussed them in previous chapters and our intention here is to summarise the arguments briefly.

First, a cross-sectional view of an industry does not reveal the nature of changes which are taking place. As Ranis (1978:18) pointed out:

When we try to explain the coexistence of large and small firms at any moment of time the historical dimension must be brought into the analysis.
The Indonesian weaving industry is experiencing a period of rapid change, in which the mechanised sector is expanding and the hand loom sector is declining. The continued use of hand looms does not necessarily mean that they are coexisting in any meaningful sense. The transition from the traditional economy to the modern industrial economy is a lengthy process, and hand looms will remain in use for many years. A 'snap shot' picture of the industry obscures this process of transition. (In this respect, an important modification of the simple neoclassical approach to the choice of technique is the vintage capital model, which incorporates the fact that all investors cannot immediately adopt the 'best-practice' technique because of past investment decisions. See Salter, 1969.)

Secondly, factor market segmentation is an important factor explaining coexistence. This is especially so in the case of the capital market. Whilst recognising that interest rate differentials between large and small firms are to be expected, we have argued that differences in interest rates cannot be explained only by the higher real cost of lending to small firms. Market imperfections also contribute to the differences, and the lending policies of the state commercial banks in Indonesia are an important element of this. Imperfections are also found in the labour market in Indonesia, although these are not as pronounced. The fact that firms of different size face a different set of factor prices in producing a similar product means that a range of techniques is adopted. In the words of Hla Myint (1971:323):

This striking pattern of high interest rates and low wages in the traditional sector and low interest rates and high wages in the modern sector [because of the underdeveloped state of factor markets] would be sufficient to account for a large part of the differences in factor proportions used in the two sectors .... What is however more significant is that ... the gaps in factor prices arising out of the underdevelopment of the factor markets tend to be widened artificially.
As we argued in earlier chapters, a more homogeneous industrial structure will evolve only as market imperfections begin to disappear.

A third explanation of coexistence is product heterogeneity. Different techniques rarely (perhaps never) produce an identical range of products. In some industries small and large firms produce quite distinct products; in other industries a complementary structure develops whereby large firms sub-contract to smaller firms. Hence these firms coexist only in the sense that they cater to separate markets: they are not in direct competition. Even in the case of the Indonesian weaving industry, where product specialisation (between firms employing different techniques) is not widespread and quality differences between techniques are not significant, the cloth produced by each of the techniques are not perfect substitutes. The more labour-intensive firms tend to produce lower quality cloth for low income consumers. This offers these firms some protection from direct competition from the larger mills, and also slows down the rate at which the traditional sector disappears.

Finally, investors have different goals, in the sense that not all of them are 'maximisers'. Although we have argued that this is not an important factor in the Indonesian weaving industry (because of the strength of competitive pressures in the industry), there are some examples of 'non-economic' behaviour: the purchase of shuttleless looms, motivated by considerations of prestige; government weaving mills, whose operations continue to be subsidised; and small-scale weavers who are reluctant to leave the industry (and whose price and profit calculations are based only on running costs).

11.3 Policy Recommendations

The existence of a range of technically efficient technologies and a competitive market environment (which compels producers to adopt the least-cost technique) highlight
the importance of eliminating factor price distortions as a means of ensuring the use of appropriate industrial technology in the weaving industry. As Lipton (1979:73) observes, a policy of 'getting prices right' is supported by economists who have

... a wide range of political attitudes. Free-market liberals see market manipulation as impeding efficient growth. Social democrats stress the damage to income distribution. Marxists fear the artificial strengthening of capitalists (and small, allied labour aristocracies) by their use of State power.

For many industries, correct prices are a necessary but not sufficient condition to ensure the adoption of techniques suitable to existing factor endowments. The Indonesian weaving industry differs from these precisely because of its market structure and the techniques which are available.

Nevertheless, two main qualifications apply to this policy prescription. First, it is essential that any proposals for policy reform be within the administrative capacity of the bureaucracy. As Arndt (1978:28) has observed, somewhat pessimistically:

There is hardly an economic policy ... which, whatever its economic or technical merits, does not now need to be weighed - and often ruled out - almost wholly on grounds of its administrative impracticability in the face of corruption.

Secondly, in the absence of alternative institutional mechanisms which provide a form of 'adjustment assistance' to groups temporarily disadvantaged by economic change, it might be argued that the pace of change should be reduced slightly in the short run. The conservative social welfare function (CSWF), usually raised in the context of the tariff debate in developed countries, is relevant to this issue (for an exposition, see Corden, 1974:107-112). The CSWF postulates that society weights a decrease in the income of one group more
heavily than an equal increase in the income of another group. It reflects a widespread feeling which exists in most communities that a significant decline in the relative real income of most groups is 'unfair' unless there are very good reasons for it. The weakening of traditional socio-economic supports in LDCs was referred to in Chapter One above. Owing to the hardship faced by handloom weavers (and other groups of workers) displaced by technological change and who have difficulty maintaining their (already very low) real income, there may be a case for easing the problems of transition by retarding somewhat the rapid introduction of new technology.  

11.3.1 The Capital Market

The availability and conditions of the supply of credit are critical factors in any discussion of the choice of technique. In Chapter Six we pointed out that state bank lending rates in Indonesia are very low, and that most small firms are excluded from the formal credit sector. Our analysis in Chapters Nine and Ten demonstrated the sensitivity of the economic performance of different techniques to changes in the interest rate. Thus, as McKinnon (1973:8) concluded, "appropriate policy in the domestic capital market is the key to general liberalisation". Without reform of the capital market, there is little scope for a shift towards the adoption of less capital-intensive techniques in the modern sector; unless realistic rates are set by government banks, most other reforms will have little effect. (Credit reform is predicated on monetary and fiscal policies which seek to achieve a relatively low and stable rate of inflation.)

1 The alternative of course is the provision of a minimum 'social welfare net' below which no individual is allowed to fall. This is a characteristic of most developed countries, and some scope may exist for the establishment of a rudimentary social security system of this type in Indonesia (see Booth, 1975:353 ff). Such proposals however, might have to be rejected on the grounds of our first qualification - weak administrative capacity.
11.3.1.1 State Banks

Reform of the lending policies of the state banks is the key to capital market reform because of the dominant position of these banks in Indonesia, and because they are directly amenable to government policy. A policy reform package should include at least the following elements.

First, and most important, it is crucial that real interest rates for both borrowers and lenders be raised. Lending rates should be raised because the present low (sometimes negative) rates encourage the adoption of excessively capital-intensive techniques, and a delinquent attitude towards arrears on the part of borrowers. Moreover, because large firms are the principal recipients of industrial credit, low lending rates represent a subsidy to these firms at the expense of the rest of the community. Lending rates should be raised to a level which approximates the scarcity value of investment funds. 2

(In Chapter Nine, section 9.5, it was suggested that a real rate of about 12 percent might be appropriate.) Deposit rates must be raised to attract a sufficient volume of savings after the substantial reduction of central bank refinancing of the state banks. Refinancing should be reduced because it represents a huge indirect government subsidy to commercial borrowers at the expense of other more pressing expenditure items, and it reduces the incentive for the banks to increase their operating efficiency.

The second area of reform relates to small credit programs. Despite the establishment of small credit programs in Indonesia, all available evidence suggests that state bank lending to small firms is relatively small. This will remain the case while administrative structures remain weak and the banks find it

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2 Some Indonesian economists and policy makers argue that, whilst real lending rates should be revised, cheap credit should still be given to firms in the export sector to ensure international competitiveness. We are sceptical of this argument. The experience of the last decade clearly demonstrates that the main obstacle to increasing Indonesia's manufactured exports has not been high interest rates. Rather, the explanations lie in the formidable bureaucratic obstacles to freer trade and in the inefficiency of the private sector.
unprofitable to lend to small firms. The banks must be allowed to recoup the extra costs of lending to smaller firms by being permitted to charge higher rates, rather than face the rigid interest rate structure currently imposed by Bank Indonesia. As the ILO report to the Philippine Government (ILO, 1974a:238) noted:

A substantially higher basic loan rate, plus the ability to differentiate (in an upward direction) among borrowers by risk, is essential in order to ensure a better allocation [of resources] and to provide access to the new medium- and small-scale industrial clientele.

Thus, instead of setting one interest rate, a band perhaps as wide as six percent (per annum) should be established. Small firms, whose owners lack political leverage and which are more expensive to service (per amount lent), would undoubtedly be charged at rates in the upper part of the range. Although this might provoke protests from small pribumi businessmen that they are being discriminated against, the main aims of the reform are two-fold: first, that banks should lend more to small firms of their own volition and, secondly, that access to formal credit sources at increased interest rates is still preferable to reliance on informal credit sources.

Other reforms of the small credits programs are also desirable. There is little point in introducing these programs unless the supply of experienced small loan officers is increased, otherwise appraisal procedures will remain woefully inadequate. (The extra cost of training these officers is another reason why an interest rate differential must be permitted.) More attention should be given to the provision of credit for working capital. Larger firms borrowing for fixed capital purposes are often given a package which also includes an entitlement to borrow for working capital; in any case, they can obtain overdraft facilities more readily. In contrast, access to credit for working capital for small firms is more difficult, even though working capital usually constitutes a relatively higher proportion of their total
capital. Finally, there is scope for greater co-ordination between officials of BIPIK and the state banks. At present each is organised along vertical lines, and horizontal communication (at the local level) appears to be limited. Arrears problems may well be reduced if technical and commercial advice to small firms was given in conjunction with credit. (There is an analogy here with supervised credit programs in the agricultural sector.)

There is, thirdly, the necessity to encourage more competition within the state banking sector, and between the state banks and other banks. In theory, each of the state banks is supposed to service a particular sector of the economy. In practice however, the banks have generally not developed specialist knowledge of sectors of the economy; the benefits of specialisation do not appear to outweigh the costs of reduced competition.

Finally, the recently announced policy that one of the conditions of large firms borrowing from state banks is that they put out some of their work to smaller firms should be approached with caution. Industrial sub-contracting is rarely found in the weaving industry, nor is it widespread in the rest of the modern manufacturing sector. Should it be implemented on a wide scale, there is a danger that this policy will be an additional form of bureaucratic intrusion into the private sector, with little benefit to either small or large firms.

11.3.1.2 Other Credit Reforms

There are no strong economic arguments for restricting the operations of foreign banks (subject to Indonesia's overseas debt not exceeding a certain percentage of export earnings). Liberalisation would increase the supply of loanable funds and enable Indonesian businessmen to have access to an additional source of cheap credit. Nevertheless, it should be emphasised that for political reasons such a liberalisation is unlikely: it would be opposed vigorously by the state commercial banks, which fear any increase in competition, and by
vocal nationalist groups.\textsuperscript{3} Similarly, a policy of encouraging the expansion of private (domestic) banks, whilst sensible on economic grounds, is probably unlikely because the majority of these banks are non-pribumi owned.

There is little scope for an immediate reduction of interest rates in the unorganised money market. Reform of the formal banking sector is an essential pre-requisite to lowering interest rates in the informal sector, as more small firms would gain access to the banks and not be forced to resort to moneylenders. Two additional reforms frequently suggested are the establishment of weaving co-operatives, which would channel raw materials through to small-scale weavers, and the clarification of land ownership titles, which would make the collateral market more liquid. The first of these options is discussed below; the second is a complex issue and results could not be expected in the short term.

11.3.2 Taxation Policy

Proposals for reform of taxation policies as they affect the selection of industrial technology depend on the goals of the government. The discussion in this section is based on the assumption that the government intends the impact of investment incentives and other taxation policies on relative factor prices to be neutral, as far as practicable. It should also be emphasised that we are discussing not the magnitude of fiscal incentives offered to investors, but rather their composition.

11.3.2.1 Coverage

There is no reason why the fiscal concessions should not be offered to all firms, regardless of size. In practice, of course, small firms may not wish to apply for them: their investment in fixed capital is usually small, hence the onerous bureaucratic requirements necessary to obtain the concessions

\textsuperscript{3} It could hardly be expected that Indonesia, which gained its independence relatively recently, would place no restrictions on the operation of foreign banks, when most developed countries still maintain considerable restrictions. For example, most states in the U.S.A. still do not allow foreign banks to open for business (Australian Financial Review, 3 April 1979:2). The same is true in Australia.
would not be worthwhile. Nevertheless, extending the eligibility of the schemes would at least remove a major grievance of the small priibumi business community, which believes that foreign and non-pribumi firms are receiving preferential treatment. Certainly there are no grounds for denying these benefits to firms which purchase second-hand machinery, as is currently the case.

11.3.2.2 Import Duty Exemptions

The present exemption from duty of imported capital equipment should be abolished. In the presence of a general duty, the exemption cheapens the price of capital and is thus a bias towards capital intensity. However, most firms will not pay the full amount of the duty owing to widespread taxation evasion, thus its removal would be less beneficial than one might expect.

11.3.2.3 Other Proposals

Most proposals for reform of the system of taxation concessions (in Indonesia and other LDCs) argue that the granting of tax holidays and the depreciation and investment allowances should include some explicit provision for employment creation to counteract the bias towards capital intensity. As we saw in Chapter Five (section 5.4) however, accelerated depreciation allowances do not bias the choice of technology. Several schemes could be adopted which give some weight to employment generation in granting investment concessions. Some of these were discussed in Chapter Five (section 5.4) above. They include, first, a points system, whereby projects are allocated a score based on their expected performance in light of the government's policy objectives; secondly, subsidies could be granted, in lieu of investment concessions, based on a project's expected capital-labour ratio; and thirdly, a variant of the second proposal, a negative payroll tax could be introduced, in which tax credits are granted according to the labour intensity of a project.
Each of these proposals would be difficult to implement; indeed the first can be ruled out solely on the grounds of administrative complexity. The other two proposals, although simpler to administer, would also require additional bureaucracy for their implementation. Firms would have a strong incentive to understate the value of their fixed capital and overstate their labour force. A further problem would be whether to consider the capital intensity of the techniques used to produce the inputs as well as the final production process. Finally, if the capital-labour ratio is used as a criterion for determining the value of fiscal concessions, ratios would have to be specified for each industry, because industries vary considerably in capital intensity, and there would have to be frequent upward revisions to allow for increases in the price of capital goods.

11.3.2.4 A Differential Sales Tax

A simpler means of correcting for the capital-intensive bias of politically-irremovable taxation concessions and easing short term adjustment problems associated with the rapid introduction of new technology may well be the imposition of a differential sales tax. For industries where the elasticity of substitution between products of different techniques is relatively high (e.g. weaving), those of more labour-intensive techniques would be subject to a lighter sales tax than the products of capital-intensive techniques for a given period (e.g. five or 10 years).

A differential sales tax in the weaving industry can be justified on the grounds of administrative feasibility and equity. On the first criterion, such a tax already applies in

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4 For an extensive discussion of fiscal measures to promote employment, see the collection of articles in International Labour Office (1972).

5 This is not a trivial point. For example, batik tulis (hand-drawn batik) is one of the most labour-intensive (final) activities, yet its input is cambric, not infrequently produced by fully integrated capital-intensive textile mills.
the soft drink bottling and cigarette industries in Indonesia. For many years a sales tax on cloth was levied, and its reintroduction in this modified form would create little additional bureaucracy. Differential rates could apply between hand and power loom firms and also within the power loom sector, although the latter would be more difficult to police. (For a discussion of the difficulties experienced with such a policy in India, see Chapter Two, section 2.4.)

The tax also satisfies the equity criterion because, unlike many industries where capital-intensive firms cater to low income consumers, weaving is an industry in which the capital intensity of the technique and income of the consumer are usually directly related. One of the few studies in LDCs which provides empirical support for this assertion is a consumer expenditure survey in India in the 1960s, quoted by Jeffries (1976:147-148). It is our impression, based on observations during fieldwork, that a similar finding would apply to Indonesia. In actual fact, the relationship between household income and the percentage of hand loom cloth in total textile purchases might be more accurately represented by the curve in Figure 11.1 but, broadly speaking, the equity criterion is satisfied.

11.3.3 Research and Development

It has become fashionable to argue that technological options for LDCs are limited because most machinery is produced

6 Two minor problems with such a tax are first, that some firms have more than one type of loom in use and, secondly, that in multi-process activities such as weaving, techniques of differing labour intensity may be employed between the various processes (e.g. mechanised weaving combined with manual preparation techniques). The simplest solution would be to consider only the most important process in assessing the tax.

7 Footwear is a good example and frequently quoted for LDCs: the poor buy mass-produced plastic sandals, the rich buy leather sandals (McBain, 1977). Batik is another obvious example.
in high-wage economies, where designers place paramount importance on labour-saving technical progress. Hence, it is seen as desirable that LDCs develop a capital goods industry themselves, in order to design machinery better suited to local factor endowments. It is argued by some (e.g. Pack and Todaro, 1969) that this is the only means of ensuring substantial industrial sector labour absorption consistent with the efficient utilisation of resources.

This argument is of limited relevance to the Indonesian weaving industry because, as we have emphasised, a wide range of techniques is available. It is not necessary for LDC manufacturers to buy looms from developed countries because several LDCs and semi-industrialised countries in Asia alone have well developed textile machinery industries, and these machines are more labour-intensive than western produced
looms. Moreover, an extensive international trade in used looms exists, to which Indonesian firms could have access if the import prohibition were lifted. In any case, Indonesia itself has had a domestic textile machinery industry since the early 1960s, although its looms have not been of high quality and production in recent years has declined. A final argument against fostering a textile machinery industry is that it is a skill-intensive and capital-intensive activity, not suited to LDCs like Indonesia with a small industrial base.

By contrast, there is scope for government intervention to assist the promotion of handicraft textiles, especially in export markets. Unlike India, no serious attempt has been made by Indonesia to promote these products, apart from a small trade in batik and sales to tourists. There are significant opportunities for the export of handicraft cloth - in part owing to the fact that trade barriers in the west are lower because this cloth is no longer produced in high-wage economies - but its sale needs to be approached in a proper commercial manner. Several small weavers in our sample reported receiving large orders from overseas, but usually they were not able to fulfil them within the required time.

Government encouragement of handicraft cloth exports could take several forms. One possibility is the establishment of weaver co-operatives, better able to service large orders quickly (see below). A more practical alternative would be the establishment of government-sponsored 'model mills', to be run as far as possible on commercial lines. The purpose of these would be to demonstrate to hand loom weavers the technical aspects of weaving cloth of intricate design. The mills could be established in major weaving centres under the BIPIK program and, where possible, they should involve non-pribumi businessmen, with their greater commercial expertise. To complement these mills, improvements in textile design must also be fostered. Recently the Institute of Textile Technology in Bandung has begun a limited research work in this field, and there is much scope for extending this program.
Another possibility is for the government to sponsor trips to other LDCs in which the design technology is more advanced (e.g., India, Thailand). Currently the government does send a few people overseas for brief trips, but in most cases they are government officials rather than skilled weavers.

11.3.4 Marketing Systems and the Small-Scale Sector

Ever since the 1920s - when the first *pribumi* traders' associations were founded and the Dutch colonial government began to foster small-scale enterprise - co-operatives have been seen as the *jalan keluar* (solution) to the difficulties faced by small firms. Through co-operatives, it is argued, problems of marketing, raw material supply, finance and technological innovation may be overcome. The development of reasonably efficient institutions would indeed represent a partial solution to these problems, but there is no evidence that this is likely to occur.

We saw in Chapter Four that the yarn distribution system (and, with it, the textiles co-operatives) of the *orde lama* was dismantled after the change in government in 1966. However, during the 1970s there has been increased discussion of the relevance of industrial co-operatives, and the Third Five Year Plan (1979/80 - 1983/84) foreshadows a major shift in policy towards small industry, proposing the establishment of three bodies (Indonesia. Departemen Penerangan, 1979:Chapter 10). These are:

(i) **Model Unit Penerangan** (*Model Information Unit*), to provide examples of methods of improving design, production technology and labour skills;

(ii) **Pusat Perniagaan/Penjualan** (*Trading and Sales Centre*), to arrange for the sale and promotion of goods, and the supply of raw materials; and

(iii) **Pusat Pengolahan dan Pemasaran** (*Processing and Marketing Centre*), to co-ordinate activities at a regional level between co-operatives, state enterprises and other government programs towards industry.
Co-operatives have great superficial (and, in Indonesia, emotional) appeal. It is hoped that they can replace the functions currently performed by non-pribumi traders who, it is alleged, are not concerned with the long term survival and growth of small industry. In theory, there are several benefits of co-operatives: first, through large orders they can exploit pecuniary economies of scale in the purchase of inputs, and pass these on to small firms. (This argument is relevant if market imperfections on the supply side exist, but there is no evidence that these are present in the case of yarn, except perhaps for very small rural units.) Secondly, well established co-operatives would be more likely to obtain access to the formal banking sector than small firms individually. Thirdly, co-operatives could have a small technical unit able to give advice to small firms. Finally, marketing initiatives could be introduced, including the establishment of brand names for cloth of certain minimum quality and direct sales outlets.

How feasible are industrial co-operatives? Certainly, they cannot be dismissed out of hand as some of their critics suggest. The commercial success of textile co-operative mills under the GKBI umbrella is evidence that efficient business practices can be introduced into co-operative organisations. Nevertheless, co-operatives consisting of small firms are very difficult to organise. Much depends on the approach of the government: the key question is how to ensure an infusion of entrepreneurial talent into bureaucratic structures. Commercial expertise in the government sector is minimal, consequently experienced (most likely non-pribumi) businessmen from the private sector would have to be recruited. The experience of agricultural co-operatives and government programs to assist small industry indicates that without this (perhaps politically unpalatable) pre-requisite, co-operatives are unlikely to be a commercial success. The experience of weavers' co-operatives in India is instructive here: despite strong government commitment and support for almost three decades, and the absence of a serious division in the business community along ethnic lines
as occurs in Indonesia, co-operatives are still beset with major difficulties (see Chapter Two, section 2.4). 8

The problem of encouraging co-operatives is symptomatic of a wider issue. Namely, should (and can) the government assist small labour-intensive firms servicing a low income clientele? There is some scope for assisting these firms through reform of the capital market and a differential sales tax, as discussed above. There is probably scope also for the purchase of hand loom cloth by the government for its own requirements. However, other policies, such as a reservation scheme for the hand loom sector or state textile enterprises guaranteeing the supply of yarn, are probably unworkable. As the ILO mission to the Philippines argued (ILO, 1974a:163), there is little the government can do to promote this group of firms short of expensive support schemes.

11.3.5 Other Policies

11.3.5.1 The Labour Market

In Chapters Five (section 5.4) and Seven it was argued that the Indonesian labour market is relatively unregulated, especially compared to the capital market. The dilemma faced by LDC governments wishing to improve working conditions for the labour force is that many of the measures which improve conditions increase the cost of hiring labour, hence encouraging private investors to adopt more capital-intensive techniques. An additional difficulty is that, owing to the heterogeneous nature of the manufacturing sector of most LDCs, labour regulations which may be appropriate to one group of firms will be inapplicable to others.

8 It is notable that, almost without exception, reports by foreign advisors on the problems of small-scale weaving units in Indonesia - usually prepared on the basis of quick trips to Indonesia - recommend the formation of weaving co-operatives. As an indication of the inadequate appreciation of the difficulties involved however, none of the reports demonstrates a familiarity with the record of co-operatives in Indonesia in recent years.
Minimum wage regulations are a case in point. In setting the minimum rate the government basically has three options. First, a rate can be set for the whole of the industrial sector (or for a particular industry and region). To be enforceable, it would have to be set at a level sufficiently low so as not to affect small low-wage firms adversely, in which case it would be irrelevant for modern sector firms. Secondly, it could be set at a higher level and enforced only in the modern sector. Thus the great majority of workers employed outside this sector would remain unaffected. Thirdly, a set of minimum rates could be specified according to firm size. If comprehensive coverage of the workforce is desired, this is the only effective option. However, the administrative obstacles in implementing such a scheme are immense.

Generally the Indonesian government has chosen the second option, and thus labour regulations are largely irrelevant for the bulk of the labour force. Nevertheless, there may still be a case for these regulations: if only as a window-dressing measure, the government feels under some pressure, both from domestic and overseas (eg. the ILO) sources, to legislate. Moreover, it might be argued that while administrative reform of taxation procedures is virtually impossible, labour regulations are a second-best (and most inadequate) means of ensuring that some of the surplus earned in the modern sector - particularly by foreign firms - is distributed through the community. A number of senior officials are known to hold this view.

If the government introduces labour regulations affecting only the modern sector, and wishes to improve the welfare of employees outside the modern industrial sector but without discouraging their employment by forcing up wages, one option would be to embark on a program of improving worker health. This might involve the distribution of (eg.) vitamin supplements or anti-worm tablets through the community health centres (Puskesmas), which have been established in each kecamatan.
The likely pay-off, in terms of improved worker health and hence higher labour productivity, may well be substantial. A program to improve workers' health and, through it, the prospects of small-scale industry would be easy to administer, inexpensive and, and, in contrast to subsidised credit programs (to which only the fortunate few have access), non-discriminatory.

11.3.5.2 State Weaving Enterprises

Appendix 5.2 examined the economic performance of the state weaving enterprises and discussed the reasons for their poor record. In all cases, the return on investment is lower than that in the private sector. The result is that government revenue is being diverted away from important and much needed projects in such fields as health and education, towards low yielding industrial investments. By establishing these mills, the community is paying a very high price for the promotion of pribumi entrepreneurship. Whilst their sale to the private sector can be ruled out on political grounds, there is no economic justification for an expansion of this sector as long as its profitability remains so low.

The best prospect for improving their efficiency is to give these enterprises greater financial independence, and ensure a closer link between financial performance and employee remuneration. At present there is little economic incentive for employees at all levels to achieve higher efficiency. It is necessary also to reduce the onerous bureaucratic requirements these firms face, together with other official exactions (see Appendix 5.2).

11.3.5.3 Licensing

The present system of licensing is deficient in two respects. First, the sheer volume of paper work is enormous. All relevant government departments and agencies (eg. Industry,

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9 A World Bank survey of the incidence of anaemia among plantation workers in the early 1970s found that the benefit-cost ratio of correcting this deficiency, in terms of improved production alone, was as high as 260:1 (Basta and Churchill, 1974).
Trade, Labour, Finance, the Investment Co-ordinating Board (BKPM) and the Central Bureau of Statistics (BPS), together with provincial and regional governments, regularly require a good deal of information from firms. There is much overlap of the information sought; with the exception of BPS, most of it is rarely used and is not readily available to researchers. Considerable scope exists for co-ordinating data collection, cutting out unnecessary questions and gathering some types of information less frequently.

The second deficiency relates to the use of industrial licensing to restrict entry to certain sectors of industry. BKPM maintains a detailed list of classifications for each sub-sector of each industry, based on advice it receives from the relevant government department.\(^{10}\) There are four main classifications, ranging from 'open to investment with priority' to 'closed'. Additional stipulations apply to some industries. These include the exclusion of non-pribumi firms, production for the export market only, or location outside Java. In most cases the criterion for closing off industries is that productive capacity is regarded as sufficient to meet current and likely future demand. A simpler solution would be to allow private investors, whose knowledge of market conditions is invariably superior to that of officials, to decide whether they wish to enter an industry. Moreover, these regulations are very difficult to administer.

11.3.5.4 The Import of Used Machinery

Appendix 5.1 concluded that there are no sound economic reasons for prohibiting the import of used textile machines. The prohibition acts to the detriment of small and medium weavers - many of whom are pribumi - and thus adversely affects the very group which the government publicly proclaims it wishes to assist. By artificially improving the economic efficiency

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\(^{10}\) See BKPM, Daftar Skala Prioritas (List of Priorities). Until 1977 this was not a public document.
of the most capital-intensive technique at the expense of more labour-intensive alternatives, it also represents a bias against employment promotion. It should be emphasised however, that a lifting of the ban may not have the immediate beneficial effects which some advocates of this policy suggest: commercial links with used machine suppliers, severed as a result of the ban, would take time to be re-established.

11.3.5.5 Industrial Statistics

The two main bodies collecting industrial statistics are BPS and the Department of Industry (see Appendix 4.1). BPS data have improved greatly in recent years, and the 1974/75 Industrial Census provides a comprehensive picture of the industrial sector. The Statistik Industri series, published annually since 1970, and including all large and medium firms in recent years, also provides a useful indication of annual changes in output and employment by industry. The main weakness of BPS industrial data in terms of their scope is that information regarding fixed and working capital is not collected. Without this, it is not possible to estimate capital productivity and capital utilisation between firms and industries.

There is scope for greater co-ordination between BPS and the Department of Industry in data collection. BPS could continue to collect employment and output data, and allow the Department to specialise. If, for example, licences for large and medium firms were updated every two years and the remainder every three years, more detailed industry-specific information could be gathered from firms. This would include information regarding technology in use, type of products produced and the nature and extent of sub-contracting. For small firms, it would be useful simply to obtain information on output and employment over time. For labour-intensive activities (such as handloom weaving) which are in decline, no comprehensive estimates exist regarding the precise magnitude of the changes.
APPENDIX A

RESEARCH METHODOLOGY

Field research in Indonesia was carried out from December 1976 to March 1978. The purpose of this appendix is to explain in greater detail aspects of our research methodology and some of the difficulties encountered in obtaining data. We explained above why the weaving industry was chosen for the study (Chapter One) and why extensive field work was necessary (Chapter One, Appendix 4.1).

A.1 Sampling Procedure

A stratified sample of firms was selected according to the technology employed, the type of cloth produced, firm size and location. A comprehensive list of power loom firms is maintained by the Directorate-General of the Textile Industry, which classifies firms according to ownership, productive capacity, location and goods produced. One possible approach would have been to select a (stratified) random sample of firms from this listing. However, in practice this approach was not feasible for several reasons. First, the selection of firms depended in part upon contacts we were able to establish within the industry. Contacts were absolutely essential in obtaining entry to firms; naturally businessmen were not prepared to divulge confidential information to strangers, whose background and intentions were not known.¹ Thus the only practical alternative to random sampling was to obtain a sample of firms which was representative of the industry as a whole, using as wide a variety of contacts to obtain entry as possible. Secondly, the Directorate-General's listing does not provide information regarding the technique in use, yet this was the most important factor in deciding which firms were approached.

¹ Even personal letters from a Minister of State to the owner of a firm do not guarantee a response, as an Indonesian academic colleague discovered during his own field research.
Thirdly, no comprehensive listing of hand loom firms exists, even at the kabupaten level.

Entry to firms was facilitated through a variety of sources. Local Department of Industry officials were usually very helpful and their relations with small pribumi weavers were good in most cases. Naturally, there was a tendency to take us to 'show-piece' firms. To counteract this, we always emphasised that we also wished to visit firms that were experiencing difficulties, and other independent contacts in the industry were established. Staff at several universities were able to assist in arranging interviews with weavers or businessmen with contacts in the industry. In some regions business associations were helpful. Entry to several firms was obtained on the basis of personal acquaintances made during fieldwork. Finally, Chris Manning, whose fieldwork was completed 12 months before ours, suggested several useful contacts. Owing to the wide range of people who assisted in arranging introductions to weavers, we are confident that a representative sample of firms was selected in each location.

Because of the existence of considerable regional product specialisation, it was necessary to interview firms in most major weaving centres on Java and Bali. In south-central Java mechanised sarung weaving is virtually non-existent; in fact, none of the 40 or so mechanised mills in and around Solo and Yogyakarta was producing sarung in 1977. Most of those firms produce cambric because of the importance of the batik industry. By contrast, in Bandung and Majalaya cambric production is small, and cotton cloth relatively unimportant. In Pekalongan, the variety of cloth produced is greater - both cambric and sarung are woven in power loom and hand loom firms. Differences in the industry between these three weaving cities - Bandung, Pekalongan and Yogyakarta (and Solo) - made it imperative that firms from each weaving centre be included. (The distribution of firms in our sample by location and technology is given in Table A.1.)
Table A.1: Firms Visited by Location and Technology

<table>
<thead>
<tr>
<th>Region</th>
<th>Hand Loom</th>
<th>Power Loom</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Bandung and District</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>(ii) Majalaya</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>(iii) Pekalongan - city</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>(iv) Pekalongan - rural</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>(v) Jepara</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>(vi) Solo</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>(vii) Pedan and District</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>(viii) Yogyakarta - city</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>(ix) Yogyakarta - rural</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>(x) Bali</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>(xi) Other</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

A.2 Data Collection

All data were collected through direct interviews with the owners of the firm or his representative. In most cases two or three meetings were necessary, preferably (after the initial introduction) with one or at most two respondents present. The first meeting was used to explain the purpose of the study, familiarise ourselves with the firm and to present a checklist of questions (from which the more sensitive were excluded). At the second meeting our detailed questionnaire was administered. We always filled in the questionnaire ourselves; in no cases were respondents asked to complete the forms themselves. A final meeting was usually necessary to check inconsistencies or doubts which arose after the results of the second interview had been analysed. Total interview time ranged from three or four hours for small firms producing only one type of cloth to 10 or 12 hours for larger firms producing a wide range of cloth and possessing several types of looms. In all, the owners of 12 firms refused a request for an interview, and data from another six firms were discarded as either inaccurate or incomplete.
A.3 Summary of the Questionnaire

A questionnaire was prepared prior to fieldwork; it was pretested over a two week period in Yogyakarta and substantially revised. Interviews were relatively unstructured. As important as obtaining hard data on output, costs and so on was to understand what determines managerial behaviour. Information was sought on the following subjects (not necessarily in this order):

(i) General Information
Year began operation; ownership; previous business experience of the owner(s); stages of production.

(ii) Output and Prices
Maximum, minimum and average monthly output and selling price for each type of cloth produced over the last 12 months; details of other products produced during the last five years; the reasons for fluctuations in output and selling prices, and changes in the composition of output.

(iii) Capital
(a) Weaving Machinery. For each type of machine (in each stage of production), the number in use, the make and model; the year of purchase, the seller, the purchase price, whether new or second-hand, the estimated current market price; for each type of machine and for each type of cloth, average production per shift, per day, per month, maximum and minimum production per shift, labour-machine ratios; reasons for sub-optimal performance in machine production (per shift), intensity of machine use and labour-machine ratio; the reasons for purchasing the particular machinery.

(b) Other Fixed Capital. The year of purchase, purchase price and current value of land, buildings, generators, transport and office equipment and all other fixed capital.
(c) Working Capital. Average value of working capital in the form of stock of final goods on hand, work-in-progress, raw materials, accounts outstanding and spare parts; maximum and minimum value of working capital; reasons for fluctuations.

(iv) Raw Materials
For each type of cloth, the quantity and type of yarn used and average yarn prices, the cost of other raw materials per unit of output; usual suppliers and method of purchasing yarn, reasons for price fluctuations.

(v) Labour
For each main group of workers, the number of workers, system of payment, average monthly total wages - including all fringe benefits - if paid on daily or monthly basis, payment per unit of output if piece-rates were used.

(vi) Other Expenses
Average monthly expenditure on advertising, packaging, insurance, electricity, fuel, transport, marketing costs, storage, repairs and maintenance, spare parts, office expenses, all other expenses.

(vii) The Industry
General comments on recent developments in the industry, expected future trends, the intensity of competition, which firms are seen as being the main competitors, the terms on which the firm competes with other firms.

(viii) Relations with Government
Non-credit assistance received from the government over the last five years (tax incentives, other fiscal assistance, technical aid, all other types of assistance); permits required by government departments; taxation payments and procedures; general evaluation of government policies.
(ix) **Credit**
The source, amount, conditions and nature of credit received during the last five years.

(x) **Marketing**
Usual marketing arrangements - distribution channels, conditions of sale; comparison of conditions of sale between different buyers; the market to which the firm caters (region, income group).

### A.4 Problems of Data Collection

The quality and reliability of data supplied varied enormously between firms, but in general the response was surprisingly good. The main problems encountered during interview work were, first, seeking the co-operation of mill owners and, secondly, obtaining accurate information about each firm. In general, it was more difficult to obtain access to larger firms, but once co-operation was forthcoming, interviewing was relatively easier because large firms usually keep detailed records and the owner more readily understood the purpose of our questions. By contrast, access to smaller firms was less difficult, but a systematic accounting system was rarely maintained.

Two main data problems arose in collecting information from firms. First, the seasonality of output and prices created problems in comparing firms interviewed at different times of the year. To get over this problem it was necessary to obtain average price and output data, and to standardised them for a given period. Fortunately, the regional product specialisation and our research schedule meant that problems of comparison owing to seasonal fluctuations were minimised.

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2 It might be noted in passing that despite the difficulties of undertaking research in Indonesia it is often alleged that it may well be easier for foreign scholars to undertake research than Indonesians. Our fieldwork experience would tend to support this view.

3 Fieldwork in south-central Java, where cambric is the main product, was conducted from June to September 1977.
The second data problem arose in estimating yarn requirements per unit of output. Owing to the range of products produced by most firms and frequent alterations in product composition, monthly data on raw material usage and output were insufficient. It was necessary to obtain raw material usage for each particular type of cloth. These data were also required in calculating the wage rates of preparation workers being paid on a piece-rate basis. This considerably complicated our questionnaire, especially for firms producing several types of cloth. Most small weavers did not have such information readily available.

Pekalongan and Bandung-Majalaya, the main sarung areas, were visited from November 1977 to February 1978.
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