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CHANGING TECHNO-ECONOMIC ENVIRONMENT

IN

THE TEXTILE AND CLOTHING INDUSTRY

IMPLICATIONS FOR THE ROLE OF WOMEN

IN

ASIAN DEVELOPING COUNTRIES

V.93-81826

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PREFACE

This study forms an integral part of UNIDO's assistance to developing countries in meeting the challenges of industrial restructuring and technological modernization designated in UNIDO's mandate and delineated in its Medium-Term Plan 1992-1997.

The study combines inputs from desk research and field visits by UNIDO's staff; commissioned country surveys prepared by local consultants for Bangladesh (research team from UBINIG, Dhaka, led by Farida Akhter), Thailand (Pawadee Tonguthai from the Thamassat University, Bangkok) and Indonesia (A. Martadi, K. Syah and S. Djajanegara); two seminars in Bangladesh and Thailand; UNIDO's commissioned studies covering specifically technology changes in the textile and garment industries in the worldwide context (Kurt Hoffman and Swasti Mitter); and a consultant's (Paul Hesp) input into Chapter seven on the experience of Japan and the Asian NICs.

The study has been generously supported by the Government of Switzerland which financed two country case studies and follow up seminars in Thailand and in Bangladesh, and the Government of the Netherlands which financed the Indonesian case study. The case studies, available as UNIDO working papers, constitute the major part of empirical evidence we have for judging the impact of technology changes in textile and garment industries on women in the Asian region.

CONTENTS

* Tables and figures without indication of source are taken from UNIDO Data Base.

List of ACRONYMS

APDC	Asia and Pacific Development Centre
ARTEP	Asian Regional Team for Employment Promotion
BTMC	Bangladesh Textile Mills Corporation
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CNC	Computer Numerical Control
EC	European Community
EPZ	Export Processing Zone
ESCAP	Economic and Social Commission for Asia and the Pacific
GDP	Gross Domestic Product
HRD	Human Resource Development
ILO	International Labour Organization
MFA	Multi-Fibre Arrangement
MITI	Ministry of International Trade and Industry
MVA	Manufacturing Value Added
NICs	Newly Industrializing Countries
NIEs	Newly Industrializing Economies
OECD	Organization for European Cooperation and Development
R & D	Research and Development
UBINIG	Policy Research for Development Alternative, Dhaka, Bangladesh
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	US Agency for International Development
VA	Value Added

CHAPTER 1

1.1 Introduction

Many of the recent technological changes in textile and garment industries have been motivated by the need to ensure better and consistent qualities and to enable producers to capitalize on sudden but potentially very lucrative changes on the markets. Other than pure production cost factors increasingly come to focus in viewing competitive strength. Demand factors such as quality, variety and just-in-time response are becoming equally important in determining competitiveness of textile and garment producers in the developed countries' markets for which also most of the developing countries' textile and garment exports are destined. The comparative advantage of the developed countries in these factors, enabled by the use of advanced computer-based technology, has already started to compensate for their labour cost disadvantage. The present cost advantage of developing countries is being challenged.

These new parameters of competitiveness have implications not only for the balance of international trade in the textile and garment products but also for the future structure of production and its geographical location.[1] In the past thirty years many developing countries have benefited from the relocation and international sourcing strategy adopted by textile and specially garment producers in developed market economies as a response to increasing labour costs. The newly industrializing countries in Asia and Latin America were the first to fully exploit this opportunity and in turn started the process of relocation to other developing countries. This situation could change as new requirements for flexibility and response in time put closer geographical location of producers to the markets as a great advantage.[2]

Increasing importance of industry-related services is an additional aspect influencing the present location strategy. New computer-based technologies can in principle facilitate the separation of production processes to a small, even home-based, subcontractor level anywhere in the world. However, this global production structure requires a presence of appropriate infrastructure to facilitate smooth and fast transfer of finance, merchandise and technical support in a coordinated and effective way. In many developing countries financial, transport-, telecommunication- and computerized information-systems as well as technical support are not up to required standards. Thus decisions where to locate and/or where to start up textile and garment production are increasingly influenced by other than pure low cost labour factors.

These new trends raise concern in developing countries about the future of their textile and garment industry. The degree of vulnerability is further increased by the uncertainty about the outcome of the Uruguay round that affects the future access to the developed countries' markets, presently regulated by the Multi-Fibre Arrangement (MFA). These concerns are justified considering the importance of this sector to the industrial development of many developing countries. The textile and garment branch has often laid the foundation for the initial stage of the industrialization process and has also played an important role in the

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[1] Introduction of new production methods and automation attuned to the market requirements have benefited more producers in the OECD countries, Italy being at the forefront, than those in developing countries. Countries such as the U.K., Switzerland and Austria have already registered shifts in the composition of imports away from low cost garments towards higher priced, higher quality and style products. In the U.K., for example, imports from developing countries have been reduced by 7 per cent between 1980-85, while those from the EEC and Western Europe have increased by almost 10 per cent in the same period. (Kurt Hoffman in "New Technologies and Global Industrialization, UNIDO, PPD.141, 1989)

[2] EC retailers, for example, are prepared to pay at least 15 per cent more for merchandise if the suppliers provide quick response. Financial Times Survey, World Textiles, FT October 3 1991

transition from import substitution to export promotion. Evidence of the success achieved by the Newly Industrializing Economies (NIEs) in Asia in following the path of "textiles first" has inspired other countries in the region which also benefited from the relocation strategies adopted by the NIEs.

As a response to developing countries' concerns, raised by these development trends, UNIDO arranged already in 1987 a regional seminar on "Industrial Restructuring Policies in Developing Asian Countries with Particular Attention to the Textile and Garment Industry", held in Seoul jointly with the Korean Development Institute. The need for technology improvements to cope with the emerging trends was one of the major issues of discussion as well as a complementary issue dealing with human resource development.[3] UNIDO's activities in this area were later followed by an Expert Group Meeting on the impact of new technologies on developing countries' industrialization prospects, strategies and policies held in Vienna in April 1989.[4] A special session during the meeting was dedicated to technological and organizational changes in the global textile garment industry.[5]

The present study specifically addresses the human resource issue. The textile and clothing sector has proved to be one of the most important industrial employers of female labour in the Asian region, and in other parts of the world. This brought benefits to the economy and also helped to enhance the social and economic status of women. Since technology has played an important role in the "demand pull" for female labour in the textile and garment sector, changes in this demand variable are of a particular concern to women.

The objective of this study is to delineate the scope and impact of technological developments in the textile and garment industry, particularly with regard to the position of women. Special emphasis is placed on the implications for employment and skill requirements, both in the short and long term.

The study is a consolidated report of a project carried out in three phases. During the first phase general background papers were prepared covering specifically technology changes in the textile and garment industries in the world-wide context. The second phase consisted of field research resulting in three country case studies on Bangladesh, Indonesia and Thailand. The final stage included desk research which provided the analytical framework, supplementary data and information for the consolidated report.

1.2 Definition of the scope and context

Benefits of investment in human resources can often be realized only after a considerable gestation period. To build upon the potential of the recently emerged large female labour force in the textile and garment industry it is important not only to examine what the impact of technology changes on women has been until now in the three countries in question, but also to look further ahead. By examining experiences of countries which have been through main restructuring of their textile and garment industry may help to identify elements constituting

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[3] UNIDO "Industrial Restructuring Policies in Developing Asian Countries with Particular Attention to the Textile and Garment Industry", PPD 104, December 1988

[4] UNIDO "New Technologies and Global Industrialization, Prospects for Developing Countries", PPD 141, November 1989

[5] Discussion paper by Kurt Hoffman on "Technological and Organizational Change in the Global Textile Clothing Industry Implications for Industrial Policy in Developing Countries"

labour force dynamics which could match technological challenges in the future. Thus this study, although concentrating on the empirical evidence from Bangladesh, Thailand and Indonesia, includes examples of countries further ahead in their industrial development which had initially been enhanced by the textile and garment industry.

This dynamic approach in the analysis places the textile and garment branch within a broader context of industrial development which is associated with technological changes and labour market restructuring. The position of women in the textile and garment branch thus reflects the employment needs and opportunities related to the country's overall industrial development.[6]

In discussing the impact of new technologies on the role of women in this context, it is useful to first delineate which "technology" or "technologies" are of main concern; what do we mean by "the role of women" in operational terms; and what do we understand by "impact".

Technology can be defined in terms of four components: machinery and equipment (*hard-ware*), know-how or skills (*human-ware*), information on new trends (*info-ware*), and forms of organization (*orga-ware*). It is an independent and/or inter-dependent change in one or all of these components which result in new technologies and technological progress. In chapter two important technological changes in the textile and garment industry are reviewed concentrating on those characteristics which are relevant in the present context, i.e. those which conceivably could have an impact on the role of women. These characteristics may include improved speed, labour savings, consistent quality, possibility of quick changes, high investment cost, skill requirements, and new organizational forms of production.

The **role of women** is interpreted through a quantitative and qualitative assessment of women's participation in the production of textiles and garments including, where possible, the discussion of economic and social constraints resulting in gender bias. Due to the absence of necessary data to assess women's contribution in terms of economic indicators such as productivity or share in the value added contributed by women, more general indicators were chosen, such as participation rate, occupational mobility, educational achievements etc. It is recognized that these indicators may not fully capture the varied roles women play in industry, but they may serve as a proximation.

Impact is here understood as a change in the position of women in the textile and garment industry, both quantitative and qualitative. The internationalization of production in the textile and garment industries has brought about a fierce competition on a global scale in terms of cost, quality, speed and flexibility of production, distribution etc. Technology plays a key role herein.

It is important to view the impact of technology in two perspectives. One is the direct impact associated with the actual change of technology in a given country leading to a change in capital/labour inputs. The other concerns the implications of changes in other countries for a country's competitiveness.

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[6] There exist two opposite points of view in the women's literature with regard to the positive/negative impact of industrialization on the position of women. For debate on the 'integration' and 'marginalization' hypothesis see Richard Anker and Catherine Hein, Sex Inequalities in Urban Employment in the Third World, The Macmillan Press, 1986

Lack of availability, reliability and consistency in the use of definitions on female industrial employment proved to be a major obstacle in monitoring changes and trends on a country basis. Gender differentiated employment statistics based on industrial establishment surveys are generally not available for developing countries. Employment data from developing countries published by the International Labour Organization (ILO) are mainly based on labour force sample surveys or population censuses and have to be interpreted with caution when analysing employment in the modern industrial sector. In most cases one is left with estimates based on micro-studies and surveys and scattered evidence. These shortcomings have been, to some extent, compensated by the use of cross-sectional data, i.e. data from the NIEs and Japan.

1.3 Methodology

The analytical framework adopted in this study incorporates the longer-term perspective as well as exposes the interdependence between technological changes in the textile and garment industry, and the overall industrialization process. Analogy is thus drawn between the stages of industrial development in general, and the textile and garment industry in particular.

Drawing upon other studies providing empirical evidence on industrial development in the Asian region[7], four development stages have been identified according to the following parameters:

a) the use of resource endowments (*comparative advantage/competitiveness*)

b) the composition of manufacturing value added (*industrial structure*)

c) technological capabilities (*level of technology/human resource development/role of women*)

d) government policies (*social and economic environment*)

The four development stages are characterized by changes in these parameters which affect not only the overall level of industrialization but also the development of industrial branches and the position of women therein, in this case textiles and garments. Although the focus of this study is on technology aspects, parameter (c) above, it is important to view these aspects as interdependent variables in the context of the industrialization process.[8] Table 1 represents a summary of the important characteristics of the four stages. It is recognized that succession of the phases is not a 'natural process'. Nonetheless, it reflects certain common features of the industrialization process in the more advanced countries in the Asian region

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[7] For selected references see "Industrial Restructuring in Asia and the Pacific, in Particular with a View to Strengthening Regional Cooperation", ESCAP, Bangkok 1991, "Women's Economic Participation in Asia and the Pacific", ESCAP, Bangkok 1987; UNIDO's forthcoming study on "Participation of Women in the Manufacturing Sector Patterns and Influential Factors", Vienna 1992, "Industrial Restructuring in Developing Asian Countries with Particular Attention to Textile and Garment Industry", UNIDO PPD 104, Vienna 1988, "In service Training, Experience of Four Asian Countries", OECD, Paris 1989, Sanjaya Lall, "Building Industrial Competitiveness in Developing Countries", OECD, Paris 1990

[8] As demonstrated by empirical evidence, the sharp increase in demand for female labour in the textile and, especially, garment industry in the newly industrializing countries of Asia was associated with the rapid growth of manufacturing at the expense of the agricultural sector, an export led industrial strategy enhanced by favourable market conditions at that time, low skill labour-intensive technology, nature of the production tasks, and low opportunity cost of female labour. On the supply side, variables such as education, cultural and religious values influencing the social and economic status of women were favoured by the advancement in industrial/economic development

TABLE 1 CHARACTERISTICS OF FOUR DEVELOPMENT STAGES OF THE TEXTILE AND GARMENT INDUSTRY

PARAMETERS	STAGE I	STAGE II	STAGE III	STAGE IV
Use of endowments *competitiveness*	abundant natural resources (cotton,silk,wool) and/or low cost labour	abundant natural resources (cotton,silk,wool) and/or low cost labour	human capital and technology	high technological capabilities (invention, adaption, application) and highiy skilled manpower key role support infrastructure
Composition of MVA *industrial structure*	light consumer industries mass production of low VA products benefiting from economies of scale dominance of state-owned enterprises	diversification -horizontal expansion: same products and factor inputs -vertical expansion: higher VA products	dominance of intermediate and capital goods branches consolidation/streamlining shedding labour intensive industries /processes	dominance of service sector including a large proportion of industry related services previously included under industry vertical integration/ cooperation concentration on high VA products for the upper-end market
Technological Capabilities *level of technology* *HRD/training* *position of women*	semi-automatic labour intensive technology using abundant unskilled labour force apprenticeship and on-the-job training sufficient opportunity costs of manufacturing labour force are close to zero for men and women alike preference for women based upon the nature and tradition of tasks	mix of labour and capital intensive technology increasing importance of vocational qualifications and in-service training industry and increasing occupational polarization between male and female labour force, opportunity costs of labour in the light, low VA industries are higher for men than women preference for women based upon low cost advantage	increasing automation to compensate for rising labour costs demand for semi- and high-skilled production labour force; increasing demand for management and marketing expertise increasing occupational and wage disparity between women and men due to educational and training differences low cost of female labour loses its prime importance as other factors enter the cost structure. Women are leaving the industry for the service sector	highly automated use of the newest technology responding to changing market conditions rather than changes in factor costs highly educated/trained manpower emphasis on multiskilling, organized in-service training/retraining, and R&D lack of technical education marginalizes women in industry, more opportunities in the supportive services
Government Policies *social/economic* *women specific*	import protection/infant industry argument employment creation policies labour legislation including selective protection measures for female labour force	export promotion incentives for foreign investment/infrastructure localization policies selective protection measures for female labour force	provision of enabling environment for local and foreign investors cooperation with the industry in training and education promotion of equal employment opportunities and wages equality between men and women, social services	cooperation with industry on training and technology development (science parks, projects) promotion of women's social and economic status (provision of social services and non-discriminatory legislations)

today. It also provides a useful analytical tool for the review of empirical evidence presented in this study.

The evidence of the overall level of industrial development would suggest the placement of Bangladesh in the first stage and Indonesia and Thailand in the second stage, although Thailand being almost on a verge to make the transition into the third stage. Japan and the NIEs reviewed in chapter seven are examples of the third and fourth stage in the conceptual framework described above.

1.4 Structure of the study

Chapter two presents a summary of the major technological and related developments in the textile and garment industries. Emerging factors constituting the industries' competitiveness on international markets are identified as well as the expected future trends. The chapter also highlights the implications for the human and financial resources required to implement these changes.

Chapters three to five present the analysis of three country case studies following the conceptual framework described in the section above. These chapters constitute the major part of empirical evidence we have for judging what actual impact, if any, there has been of the technology changes in textile and garment industries on women in this region.

Chapter six summarizes the experience of Japan, Hong Kong, the Republic of Korea, Singapore and Taiwan Province of China in restructuring their textile and garment industry in the context of industrial development. The emphasis is on the implication for the structure of the labour market in general and female industrial labour mobility in particular. The experience of countries such as Japan and the Asian Newly Industrializing Economies (NIEs) can provide a valuable input into strategy formulation and policy measures addressing the concern for female workers in the textile and garment industry within a longer time perspective.

Chapter seven draws the main conclusions arising from the empirical evidence and identifies areas of concern related to the future development of the textile and garment sector and the position of women therein. Chapter eight outlines possible responses to the issues identified in chapter seven, and delineates areas and programmes for technical assistance.

CHAPTER 2
TECHNOLOGICAL AND ORGANIZATIONAL CHANGES IN THE GLOBAL TEXTILE/GARMENT INDUSTRY

This section summarizes the relevant technological and organizational changes in the textile/garment branch which have occurred in the last 40 years. Due to the differences in character and speed of adaptation, technological innovations are treated separately for the textile and garment branch. Most of the organizational changes, however, apply to both branches and are thus not differentiated by branch. Major inputs into this section were provided by other studies carried out by UNIDO.[9]

2.1 Technological innovations

In order to capture the relevant aspects of technological changes and provide a general background for the assessment of the state of technology development in the three selected countries, the review is organized around the following criteria:

a) ***the time sequence of changes*** - helps to identify the reasons for differences between the availability of technological innovations and their application in the countries under review;
b) ***the phase in the production process where technology innovations have taken place*** - reveals technological interdependence and scope for selective/incremental technology improvements;
c) ***improvements achieved by technological innovations*** -provides an indication of changes in competitiveness; and
d) ***capital cost and employment implications*** - points out the suitability/appropriateness of the various technological solutions to the situation of the countries under review.

2.1.1 The textile industry

The period of technological changes which have occurred during the last forty years can be broadly divided into three phases. The period of the 1950s and the early 1960s is associated with the major breakthrough in applying well known engineering principles to the construction of textile machinery, especially spinning frames and looms which reduced vibration allowing for higher speed. This laid the foundation for the development of various attachments to the basic equipment that were introduced in the 1960s primarily as labour saving devices.

It was also during this period that the introduction itself of new technologies underwent a radical change. Through the late 1950s, textile producers would build in some custom-made features to newly acquired machinery to reflect proprietary mill technology or engineering practice. By the mid-1960s, most innovations started to become available on a commercial basis, i.e. independent of proprietary technology, and any firm could buy and install any one of the new spinning frames and looms or other machines. Machinery development had become externalized, from textile producers to large engineering groups in England, Germany, Switzerland, Italy and Japan.

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[9] UNIDO,"Industry and Development, Global Report 1990/91", Vienna 1990; Kurt Hoffman, "Technological and Organizational Change in the Global Textile-Clothing Industry. Implications for Industrial Policy in Developing Countries" in "New Technologies and Global Industrialization, Prospects for Developing Countries", UNIDO, PPD.141, 1989; UNIDO, "Technological and Organizational Advances in Textile and Clothing and Their Implications for Thailand", unpublished working paper, 1990.

The most radical changes in the core technology of spinning and weaving came in the late 1960s and during the 1970s, such as the introduction of rotor spinning and shuttleless looms. This was the period when new technology was sought to increase efficiency and thereby to combat the cost-based competitiveness of lower wage producers from Asian countries.

The third period starting from the late 1970s and including the 1980s is characterized by the introduction of microelectronics-based technology to the automation of industrial processes. This has allowed the joining up of various stages of production into continuous and interdependent processes resulting in higher quality and flexibility of production that yields a faster response to changing market conditions. These possibilities have not yet been fully exploited primarily due to still lacking complementary changes in organizational and management areas.

The major technological innovations during the period between 1950 and 1990 are listed in Table 2 below. The changes are applicable to the following main stages of the production process:

pre-spinning (handling of raw material)
spinning (yarn conversion, texturizing);
weaving and knitting (fabrication); and
finishing and dyeing (end use formation).

Table 2: Major Technological and Process Innovations in the Textile Industry, 1950,...,1990

Technology innovation	Process innovation
Automatic bale feeders	Two-for-one twisters
Automatic blending feeders	Yarn texturization
Chute-fed cards	Electronic stop motion and automatic release devices
Precision draw frames	Automatic loom winders
Automatic doffers	Shuttleless looms
Automatic end-piecing	Electronic knitting machines
Automatic drawing-in	CAD for fabrics
Self-twisters	Latch-needle warp knit machines
Composite yarn systems	Double-knit machines
High-draft systems	Needle punch machines
Open-end spinning	Tufting machines
Balloonless spinning	Electrostatic flockers
Electronic monitoring and stop motion devices	Jet dyeing
Energy efficient equipment	Computer colour analysis and matching
Reduction in polluting effluents	Transfer printing
Less floor space requirements	Rotary screen printing
Automated handling equipment	Automated instrumentation
Fabric shrinking control process	Continuous dyeing and finishing ranges
Computer controlled jacquard heads	Long-staple spinning process (shortened version)
Computer integrated manufacturing	
Some form of machine intelligence	

Source: A.M. Benvignati, "The relationship between the origin and diffusion of industrial innovation" in Economica, vol. 49, No. 195 (Aug 1982) and Transnational Corporations in the Man-made Fibre, Textile and Clothing Industries, United Nations publication, Sales No. E.87.II.A.11

The major improvements achieved by the innovations can be summarized as follows:

a) machinery and methods yielding better material handling within the mill;
b) yarn spinning methods resulting in increased labour productivity and fewer discrete processing steps;
c) looms with higher speed and improved fabric quality;
d) dyeing, printing and finishing equipment improving the fabrics surface appearance;
e) new methods of carpet manufacture, including needle punch; and
f) automation of machinery functions, machine self- diagnostics, machine self-correction from deviations, textile design along with colouring, and the interlinking of processes.

The technological innovations have not only penetrated all production phases making the industry highly automated, but the interdependence of technological improvements throughout the production phases has also increased. The innovations in processing operations have led to greater machine speeds; the innovations in process control in turn enabled the manufacturers to make good use of the higher speeds as well as greatly improved the design and processing flexibility in small batch production. The higher machine speeds also required new developments in the production and chemical composition of fibres and yarns.

Application of new technologies has led to a fast growth in labour productivity in the textile industry which has increased faster than in either garments or overall manufacturing, see Table 3 giving figures for the US.

Table 3: Labour Productivity Growth in Textiles, Garments, and Total Manufacturing, USA, 1961 to 1985 (annual percentage)

	Textiles	Garments	Manufacturing
1961 to 1972	4.88	1.28	3.51
1973 to 1985	3.71	2.75	2.90

Investment costs associated with technology improvements have risen considerably. Investment in the European Community countries has been US$ 3 billion in the last three years, and in the US$ 4 billion in the last two years with an estimated additional US$ 4 billion a year required over the next five years.[10]

The impact of automation on employment has also been significant. During the last 15 years, employment in the textile and clothing industry in the entire EC area has declined by 40 per cent and the forecast for the 1990s is a loss of 700,000 to 1 million jobs in the textile sector alone.[11] The impact on employment has also been in terms of occupational restructuring. The proportion of operators and unskilled labourers in the textile labour force has decreased while the share of technical

[10] Financial Times Survey, World Textiles, Financial Times October 3, 1991.

[11] UNIDO working paper for an Expert Group Meeting on the Implications of the Single European Market for Industrialization in Developing Countries, Vienna, 18-20 March 1992.

and management staff has increased.[12] The new technologies require specialized skills in textile engineering, maintenance, design, computer science, and marketing.

The emerging trends for the 1990s point towards the increasing importance of market rather than cost factor driven technological changes. The predicted changes are in the areas of improving existing technology to facilitate higher speeds, flexibility, greater reliability, automation, quick response, cost saving and safety.[13]

2.1.2 The garment industry

The pace of technological innovations has been slow up to the beginning of the 1980s. The main innovations in the pre-1980s period concentrated on sewing technology by improving speed and durability of the sewing machines and developing attachments for specialized tasks which later resulted in the emergence of task-dedicated machines. In the pre-assembly phase the introduction of fast, automated cutters in the late 1970s replaced the operator driven hydraulic die cutting machine.

The major technological changes, however, occurred in the 1980s when the application of microelectronics penetrated all stages of the garment production although at different pace and degree of intensity. The most significant innovations took place in the pre-assembly stage. The introduction of computer aided design (CAD), computer numerical control (CNC) cutting systems, and computer aided manufacturing (CAM) capable of joining a number of tasks and processes have led to material and labour savings. In the assembly stage the initial application of microelectronics concentrated on the development of special purpose dedicated equipment capable of handling higher volume at greater speed. The most recent innovation consists of multi-purpose equipment capable of quick adaptation to changing styles. These changes reflect new competitive factors which stimulate technology developments and enable a producer to capitalize on quick responses to changing demand.

The most significant technological changes which have taken place in the pre-assembly, assembly, and finishing stage of production during the last ten years or so are summarized below.

Pre-assembly (design, pattern making, grading, nesting, marking, and cutting)

The first generations of CAD systems were marketed mainly on the strength of their labour and material savings capabilities. CAD systems could efficiently do grading and marking previously done manually by highly skilled workers. Reductions in labour usage of up to 50 per cent, and a 15 per cent waste reduction were demonstrated.

CNC cutting systems were promoted on the same basis. By cutting faster (20 meters/minute), more accurately and in higher volume (up to 300 layers at a time),
computer-controlled cutting systems showed clear advantages over manual systems. Skilled labour usage was cut by 25 to 60 per cent, material utilization improved to over 90 per cent, and productivity increased two-to threefold.

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[12] In the USA the proportion of blue-collar workers decreased from 67.2 to 63.8 per cent, while the share of technical and management staff increased by 1.5 and 0.5 per cent respectively between 1975 and 1985. In France the share of blue-collar workers dropped by 15 per cent and the numbers of engineers and managers have risen by 4 per cent in the recent years. ILO "Vocational training and retraining in the textile industry", Textiles Committee 12th Session, Geneva, 1991.

[13] Financial Times Survey, World Textiles, Financial Times October 3, 1991.

More recently, the shift in emphasis from saving on labour and material costs towards the need for rapid response has greatly enhanced the attractiveness of pre-assembly CAD/CAM systems. The systems are seen to be perfectly suited to the needs of the industry in an era when flexibility and design are the keys to competitive success. By eliminating various manual stages in the grading and marking process, the time taken to move through the pre-assembly stage can be reduced by two to six times, allowing jobs previously done in days to be completed in hours, and hour-long tasks to be carried out in minutes.

However, the present price range of CAD systems starts from approximately from US$ 30,000 and can go up to US$ 350,000 depending on the size and sophistication. Linking up a computer controlled cutter with CAD (CAD/CAM) brings the price even higher, starting from US$ 180,000 for a single system.

In spite of the high investment costs there are signs of a growing use of CAD not only in the developed countries but also in the Asian region. Nearly 60 CAD systems are already in Hong Kong, the Republic of Korea and Thailand alone, with over 60 per cent of these having been installed in the last three years. All the major suppliers have opened regional sales and service centres in either Hong Kong or the Republic of Korea and have been aggressively marketing their systems through direct visits and sponsored seminars in the region. As prices come down, it is clear that the use of CAD systems will become commonplace also in other developing countries.

Assembly

This is the most important stage of production since it accounts for 80 per cent of value added in the clothing industry and involves 80 per cent of the work force. Improvements in technology in the assembly stage have not as yet led to any substantial decrease in employment primarily due to the still unbroken link between one machine - one operator. The basic equipment still in use is the standard industrial sewing machine that is low in cost, robust, and simple to operate and maintain.

Improvements done by adding microelectronic-based control units for handling more complex tasks have been made without any major redesign of the machine. The resulting increase in labour productivity on specific tasks is dependent on the degree of task dedication associated with a machine. The highest productivity has been recorded on a one-task dedicated machine, leading to an increase of 37-79 per cent. Although the productivity increases for specific tasks are lower as the number of tasks performed by one machine (pre-programmed convertible units) increases, the flexibility is greatly enhanced. The most recent microelectronically controlled sewing machine which is operator programmable leads to only 11-26 per cent increase in productivity on specific tasks. However, the machine scores high on an easy and fast convertibility and improved sewing accuracy although higher requirements are put on operator skills.

Introduction of computer-based technology has increased the cost of a standard industrial sewing machine from US$ 300-1,500 to a range of US$ 12,000-55,000 for a pre-programmed, dedicated machine capable of performing one or a number of tasks. The latest, operator programmable sewing machines cost between US$ 5,500-8,000. The cost of a multi-task operator programmable machine is lower than that of a dedicated machine. One of the cost advantages of sewing machines incorporating microelectronics is the reduction in training costs and times as shown in Table 4.

Table 4: Reduction in Training Cost or Time Due to the Use of Micro-electronic Equipment in Sewing

Activity	Reduction in training time or cost
Collar and band attach	60% reduction in training time
Hip pocket set	40% reduction in training time
Collar stitch	30% reduction in training time
Small parts run stitch	50-70% reduction on training time depending on task
Attach decorative tabs	Training time reduced by 90% using unskilled versus skilled operator
Button hole and button attach	30% reduction in training time
Right hand shirt fronts	20% reduction in training time
Collar and band attach	Reduction in training costs of 93%
Jeans pocket set	Reduction in training costs of 70%
Design embroidery	Reduction in training costs of 90%

Source: Hoffman, K. and Rush, H., *Microelectronics and Clothing: The Impact of Technical Change on a Global Industry*, New York/London 1988.

Finishing (inspection, pressing, packaging, and dispatch)

Although the finishing stage of the clothing production process is more important as the value added of the final product increases, there have been relatively few technological innovations at this production stage. Highly automated pressing units, vacuum steam ironing tables and body-steam presses have been devised to ensure a high quality finish. Inspection and packaging are still performed mostly manually.

On the whole, technological changes in the garment industry have been moderate and have occurred relatively recently compared to the textile industry. The technological innovations have neither been as successful in automating the garment industry as in the textile industry, nor have the most radical changes occurred in the core of the production, i.e. sewing. Furthermore, the level of technology interdependence throughout the garment industry is much less pronounced than in the textile industry. It is organizational aspects rather than technological innovations which result in the interdependence of production processes.

The outlook for technological innovations in the 1990s and beyond promises a major breakthrough in solving the assembly automation problem. Public sector funded R&D initiatives complemented by private investments in R&D projects that are being carried out on a collaborative basis between clothing manufacturers, equipment producers, and automation specialist are known to be taking place in the USA, EEC, Japan and Sweden.[14] The emphasis is not only on the automation of the assembly stage but also on organizational aspects leading to vertical integration of the textile-garment industry to increase the industry's responsiveness to changing demand down to the level of an individual customer.

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[14] The US project, known as the Textile & Clothing Technology Corporation (TC2) involves also trade unions. The EEC project falls under Section 9 of the BRITE programme (Basic Research in Industrial Technology for Europe). The Japanese project, sponsored by MITI was established in 1983 with a 7-10 year timetable and US$100 million of government and industry support.

2.2 Organizational changes

Organizational changes form a necessary complementary part of technological changes in the textile/garment industry in order to strengthen the responsiveness to the market. Two major areas of the organizational changes are discussed below: interaction between the retailers and manufacturers, and new organizational forms of production within the industry itself.

2.2.1 Buyer/supplier relations

The changes introduced in the buyer/supplier relationship stem from the realization on the part of the industry leaders that the responsiveness and competitiveness of the textile/clothing complex can be greatly enhanced by closer cooperation between the various actors involved in the whole process from raw material processing to the retail end. The impact of this realization has already been felt in the following areas:

Design relationships have been altered to include retailers as well as textile and garment suppliers in design teams working together on fabric, colour and pattern selection and on the progressive development of a range of clothes to be put on the market. This is a marked departure from the previous design work being done either by a manufacturer or a retailer in isolation from each other.

New elements of stability and trust are being introduced into the contractual relationship between buyer and seller. Buyers are willing to deal with fewer suppliers over a longer term. Contracts may also include provision of technical advice, financial commitments to cover cloth purchases and clothing orders. Suppliers are chosen on the basis of guaranteed quality of their products, ability to change at short notice and reliability of delivery rather than on price alone. This is a change from a situation where the price was the main determinant of sourcing resulting in an arms length relationship at all levels, from retailers down to fibre suppliers.

Reduction in lead time, i.e time between an order being placed and products being delivered on the market, results in shortening production runs. The pressure on a supplier to switch rapidly between lines of production is twofold. Retailers adjust their order, placed at the beginning of the season, to accommodate demand for the best selling styles. In addition, changes in fashion seasons are getting more frequent, 1 to 6 per year. Whereas before orders were placed for thousands of dozens, now the order can be for as few as 50 to 100 dozens. The lead time has been reduced from an average 15-22 weeks to 2-8 weeks.

The above changes point towards quality, variety, reliability and just-in-time response as the emerging sought after suppliers' qualities which buyers are willing to reward by greater contractual stability and closer cooperation.

2.2.2 Changes in the organization of production

The cost advantage resulting from economies of scale in long-run production has been eroded by the new elements constituting competitiveness. Adjustment to smaller and more flexible production lines requires a new approach to the management of technology and human skills, and to organizational structures within and between firms. The following are examples of areas where new approaches have already been adopted.

Changes in emphasis on human skills rather than technology are already apparent. Clothing manufacturers in particular, but also textile firms, are becoming increasingly aware that enhancement

of flexibility in their production could lie in the redeployment and retraining of their production workers rather than seeking automation solutions. The tendency now is to provide broader initial training and continuous retraining to produce multiskilled workers, capable not only of performing different tasks on one or more machines but also of being responsible for quality control and planning their own work schedule.

Reorganization of the production line from a bundle system to a new workflow pattern is being adopted. In the clothing production, for example, workers are organized according to unit flow, "group" technology and "quality circle" principles. This means small lots of garments are assembled from start to finish by small groups of multi-skilled workers. The payment and incentive structures have shifted from piece rate to pay scales for individual workers according to skills acquired through in-house training and the complete product performance of the group.

Change in management style and use of technology are complementary to the organizational restructuring. In order to capitalize on the potential of multiskilled labour force the management structure has to be opened up to allow for much closer management-worker interaction. Management also has a new range of technical aids available for more efficient production planning and control, job scheduling and interaction with other firms and retailers. Computer-based information systems are developing fast allowing for instant communication between production, product and delivery requirements.

Provision of industry related services such as information on market trends, design intelligence and sourcing possibilities; provision of technical assistance in the choice and adaptation of technology (new and old); consultancy in areas of factory layout, management, and organization structure as well as training courses at all skill levels are becoming vital to industry competitiveness. A large firm can provide these services internally either within a plant and/or outside to a number of small sub-contractors working for the firm. A well documented example of this approach is the case of Benneton. Smaller production units can buy these services externally either on the open market and/or by joining a co-operative which provides these services collectively. Successful examples of this kind are consortia in the northern districts of Italy.

Vertical integration and "deverticalization" are examples of a different approach to the restructuring of the textile and garment industry in the OECD countries. The strategies adopted in the U.K. and the U.S. have led to an increased concentration and vertical integration, complemented by large investment in a new generation of machinery and mass rationalization leading to extensive job losses and disappearance of many small firms.[15] Promotion of medium- and small-sized firms as independent suppliers, subcontractors, or co-operatives specializing in specific products or production phases has been the strategy adopted in France, Germany, Italy and Japan. This resulted in a positive rather than negative effect on employment.

2.3 Conclusions

The recent developments of new technologies in the textile and garment industry have not only been in response to changing costs of factor inputs but increasingly more so to changes in demand conditions. The application of new technology has resulted in a newly found competitive strength of the developed countries. Although the developing countries enjoy an upper hand in labour cost over the industrialized countries, the significance of this advantage is rapidly declining as quality aspects, design, and speed and reliability of delivery take on ever increasing importance. The introduction of computer technology into production, management and marketing is the new strategy for the "age

[15] ILO, Textiles Committee's Report III, Geneva, 1991.

of time-based competition". New approaches to workers' training, management techniques and production organization puts emphasis on human skills to provide the industry's competitive edge.

However, the immediate relevance of many of these developments to developing countries is open to question. High investments associated with the application of new technologies have to be critically assessed in the context of techno-economic environment in the developing countries, where opportunity cost of capital is high and potential savings in labour costs are small. In addition, the scarcity of skilled labour as well as supportive industrial infrastructure pose limitations to the effective use of the new technologies.

Furthermore, few of these technologies generate sufficient cost savings for developed country firms to threaten the cost advantages of very low wages, at least in the short term. Hence for the present and near future, developing countries do not face a technology-driven erosion of their low-wage based competitive advantage. But, this is not to say that technology developments in the industrialized countries are without implications for developing country producers. Because of the growing importance of flexibility, fast response, and design, high technology has become a critical factor for any firm that wants to enter the highly competitive markets in the developed countries. There, a low price is no longer the only important determinant of demand.

It is thus important for the future development of the textile-garment sector in the developing countries of the Asian region to assess possibilities for incremental technological improvements as well as to review their marketing strategy. The scope for selective improvements is larger in the garment than in the textile industry due to the higher degree of interdependence of technology changes in the textile production. It could also be argued that in the clothing industry the adoption of organizational changes could yield higher and faster return on investment than automation of production. Since low price is still a determining factor on domestic and regional markets in Asia, their development would guarantee demand for low-wage producers for some time still.

Whatever strategy is adopted with respect to technology and marketing, skill development should be of an immediate concern due to the gestation period of investment in human resources. The emerging trend points towards a shift from the mass production of standard products, using narrowly skilled workers and dedicated, high volume technology towards more specialized products using a broadly skilled workforce and universal, multi-purpose machines. Hence, in establishing training programmes and institutions both short- and long-term skill requirements of the textile/garment branch have to be considered.

CHAPTER 3
THE TEXTILE AND GARMENT INDUSTRY IN BANGLADESH[16]

The examination of the textile and garment industry is divided into three sections dealing with the formal textile, handloom and garment branch. This division is important since development features of these three sectors are very different, and so is the role of women in them.

3.1 The formal textile branch

The cotton textile industry is one of the oldest large-scale industries in Bangladesh, dating as far back as 1908 when Bangladesh was still a part of India. India was a large producer of raw cotton with a tradition of home spinning and weaving dating to the 17th century. The Bengal region produced only small amounts of raw cotton and depended on supplies from the Bombay area or from abroad. Later, however, favourable market conditions and raising unit wage cost in the Indian cotton industry attracted new investments to Bengal. In 1947 the Bangladesh textile industry had a total of 109,747 installed spindles and 2,717 looms.[17] In 1988 the registered capacity was about 1.4 mill spindles and 8,000 looms in the formal sector.[18]

This expansion was a direct result of import substitution policies by the Imperial Government in the 1930s and governments following the separation from India in 1947 and the liberation in 1972. This favourable policy environment was further enhanced by the boom in foreign exchange availability during the Korean war and a large-scale allowance of deferred payments by the industrialized countries, particularly Japan. The period of 1960-65 is most significant in terms of the establishment of large-scale composite units combining spinning and weaving. After the liberation of Bangladesh in 1972 the Government sought to discourage the development of the weaving capacity in the mill sector, recognizing the importance of the traditional handloom sector. This strategy has largely remained effective until now. The trend in the 1980s suggests specialization in spinning rather than weaving and is marked by an increase in medium size rather than large-scale spinning mills. There now are 61 registered textile mills.[19] 27 are integrated units of which 12 are in the hands of the Bangladesh Textile Mills Corporation (BTMC), an autonomous government-owned corporate body.

The contribution of the textile industry to the economy of Bangladesh, although still relatively high, has declined during the last twenty years. The textile output measured as percentage of total manufacturing output in constant 1985 US $ declined from around 40 per cent at the beginning of the 1970s to around 25 per cent in the late 1980s. The same can be observed about the industry's value added as a percentage of the total manufacturing value added, and the industry's contribution to the total manufacturing export, see Figure 1. The industrial textile mills presently satisfy less than 20 per cent of the domestic demand for textile products.

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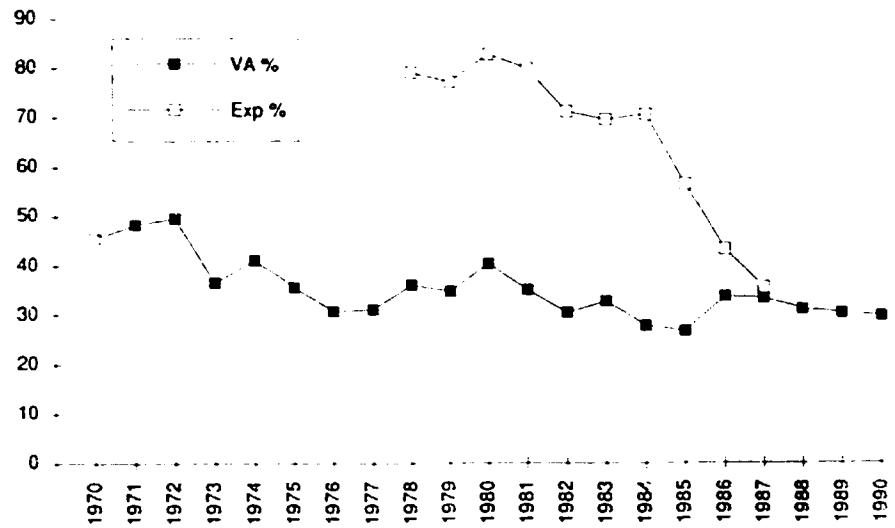
[16] This chapter is primarily based on a case study issued as UNIDO Working Paper "Bangladesh's Textile and Clothing Industry The Role of Women", May 1991

[17] The traditional handloom sector is excluded. The Census Report of 1951 indicated 183,251 looms in this sector

[18] Textile Directorate 1988, Dhaka

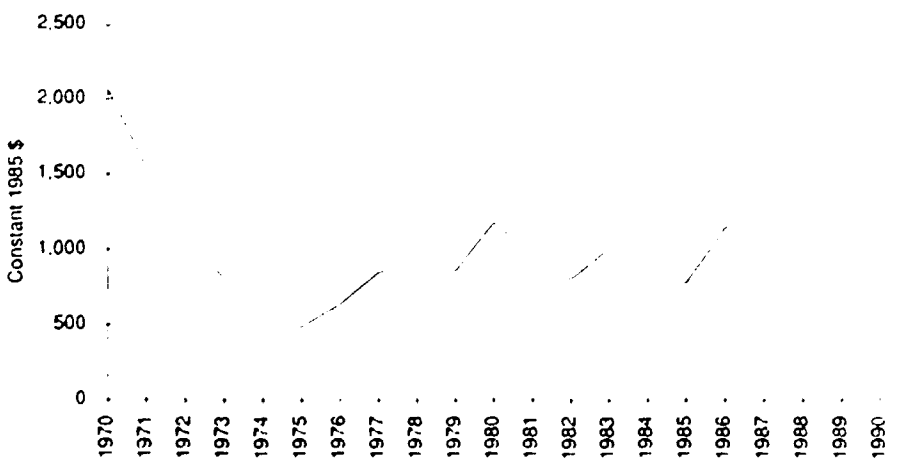
[19] Textile Directorate 1988

Fig. 1: **Share of Textiles in Total Manufacturing Value Added and Exports, Bangladesh, 1970,...,1990**



Although the textile industry has been present since the 1920s its development in terms of technology has stagnated. The machinery in the existing textile mills dates back to the 1950s and 1960s. The technology is still semi-automatic and highly labour-intensive. There is no sign of using automation in linking up various stages of production. Only a few machines have been replaced or modified, but the number is insignificant. It is only the more recently established mills which have a more modern type of machinery but which still is far inferior to the fully automated technologies available today. This stagnation is reflected not only in the persistently low value added per employee[3] between the late 1970s and 1990 (see Figure 2), but also in the lack of product diversification/specialization. Composite mills are still producing predominantly a medium variety of woven cloth.

Fig. 2: **Value Added per Employee in Textiles, Bangladesh 1970,...,1990**



[3] Value added per worker can be used as a crude indicator of capital intensity, capacity utilization and pressures to carry spare labour

The size of total labour force in the textile mills has been relatively stable in the 1980s, around 300,000, representing between 60 and 65 per cent of total manufacturing employment.[21] There are no data available on the women's participation, but it is estimated that men comprise about 90 per cent of total labour force. This is contradictory to the evidence of high female participation in this sector in other countries. The following four possible explanations can be given for this diversion: socio-cultural values, equally low opportunity cost of male labour, low technology/automation, and government policy and legal framework.

The traditional division of labour in the handloom sector excludes women from weaving. Women are confined to pre-weaving processing of yarn including warping. Although this role is extremely important, it carries no recognition in the patriarchal culture where men are the operators of looms and have a high status. This has affected hiring practices in the industrial textile mills where, if women are hired at all, they are in the spinning section, sometimes in the blow room.

The declining commercial agriculture where man would traditionally find employment and lack of other employment opportunities in the industrial sector results in an increased job competition. The scarcity of jobs is also reflected in the over-qualification of textile production workers above the stipulated requirement up to grade eight. The disparity in educational attainment between men and women presents an additional advantage for men. The illiteracy rate is 58.9 per cent for men and 76.2 per cent for women. The disparity between men and women increases with the level of education. According to the national statistics 24.2 per cent of males have completed primary school, 10.6 per cent secondary school, 5.1 per cent have a High School Certificate (HSC), and 1.2 per cent have a graduate degree. The corresponding figures for female students are 17.8 per cent, 4.7 per cent, 1.1 per cent and 0.2 per cent.[22]

The argument used that women are physically unsuitable to operate big machines is partly relevant to the situation in Bangladesh and relates to the low level of automation and factory layout. The installed technology includes only partial automation of the production line and makes very limited use of hydraulics and other devices to reduce the need for physical strength on the part of the operator. Results from a survey done in a textile mill established in 1983 with Chinese aid reveal that the new machinery imported from China was very well suited to women operators. This is because textile workers in China are predominantly women. This demonstrates that if textile mills are modernized with machinery which is not gender discriminatory there is a scope for increasing female employment.

The Government has recognized the potential for enhancing female labour in the textile industry. Hence their note of February 1989 and subsequent circular issued to the BTMC mills urging the management to recruit female workers in all the posts "appropriate for women" and to increase their share in total recruitment to 20 per cent. The circular also mentions that "the recruitment of female workers will serve the purpose of establishing the status of women in the society as well as achieve the goal of family planning". Although this is certainly a positive step to increase job opportunities for women, the wording "appropriate for women", implies that women are not able to do all kinds of work. This leaves large scope for discrimination in hiring. Hiring practices are influenced by the continuous adherence to traditional socio-cultural values which confines women to subordination and seclusion and also sanctions the gender-division of labour.

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[21] UNIDO data base

[22] Bangladesh Bureau of Statistics 1989

There are no less than 35 major Acts and Ordinances dealing with labour matters, most of them dating back to the pre-independence period, but most of them fail to benefit women workers.[23] The Employment of Labour Act of 1965, for example, describes the various worker categories only in a male form. Presumably female workers were not evident at that time. However, not even the 1985 modification of the Act has any reference which would show that industrial workers can belong to the female sex. This is in spite of a significant increase in the proportion of women in the total industrial labour force, from 4 per cent in 1974 to over one third by 1985/86.[24] Special rules covering women are often used not for the benefit of women workers, rather to their disadvantage. Safety regulations, working hours, and maternity leave are neither observed nor endorsed, yet often used as an excuse for not hiring women.

3.2 The handloom sector

Handloom production, although classified as an informal sector, is an important part of the textile manufacturing in Bangladesh. It satisfies over 80 per cent of the domestic demand for cotton products and is the second largest employer in the rural areas. It has developed from a long tradition of a recognized craftsmanship and artistic excellence in parallel to the large-scale industrial production. The production is still predominantly of the cottage type, supplementing income from agricultural activities. The Census Report of 1951 indicated 183, 251 looms in this sector and a total number of 407,300 workers. In 1987 the number of handloom establishments was estimated at 162,000, employing an estimated number of 780,000 workers, including part-time employees.[25] The figure on the total number of handlooms is not available but is estimated to be between 700,000 and 900,000.[26]

The home-based establishments, with 1-2 looms, account for 55 per cent of all establishments but only for 15.4 per cent of the total weaving capacity. The other type of enterprises is larger households, with 3-5 looms, accounting for 22.3 per cent of the establishments and 17 per cent of the weaving capacity. Larger enterprises, karhanas, are more a factory-like using 6-20 and more looms. They account for 23 per cent of the establishments and 67 per cent of the weaving
capacity. The district statistics show that 58 per cent of all persons employed in the sector consist of family members.[27]

Adaptation of new technologies in this sector can be traced to the mid-sixties when semi-automatic Chittaranjan looms were introduced on a small scale. Introduction of this technology gave rise not only to larger type of establishments but also product specialization. The semi-automatic loom has an output three times that of a traditional loom but the quality and design is said to be inferior to that of the handloom which is used to produce the traditional cloth recognized for its high quality and a special weaving skill requirement. These craft products have a high value and are intended for export or the local upper-end market. Semi-automatic looms can produce cheap coarse saris intended to meet the demand of the poor. They can also produce finer fabrics by using yarn of finer count and jacquard machines for design.

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[23] For details see Hameeda Hossain, Roushan Jahan and Salma Sobhan 'Industrialization and Women Workers in Bangladesh' in Noeleen Heyzer ed."Daughters in Industry", APDC, Kvala Lumpur 1988.

[24] Bangladesh Bureau of Statistics

[25] UBINIG 1991.

[26] This is a rough estimate based on the UBINIG data about the establishments.

[27] UBINIG 1991

The division of labour in this sector is strongly biased in favour of men who have traditionally been weavers in Bangladesh. Women have not been taught the skills. Their role has traditionally been confined to the pre-weaving processing of the yarn. This tradition of male dominance in weaving activities and exclusion of women is rather special for Bangladesh. One possible explanation could be that the intricacy of the traditional patterns needs an uninterrupted concentration over a long period of time. Women performing other duties connected with household and child rearing could not afford to give this activity their undivided attention. Continuing adherence to this gender division of labour adversely affects the potential role of female labour in this sector. Their work, whether in the family production unit or outside as a hired labour, is undervalued and less paid than that of male weavers.

However, there are now movements to form women's cooperatives and teach women to operate Chittarajan looms in order to increase women's income earning opportunity in rural areas. An increased weaving capacity would also increase the demand for the pre-weaving processing of yarn which could be satisfied by subcontracting to women at home or bringing them into a centralized larger unit of production. The latter option is apparently more favoured by women since it gives them an opportunity to gain the independent status of a worker and thus strengthen their social and economic position.

There is very little known about changes in the traditional pre-weaving yarn processing. There are a few reports about women trying to increase their productivity by simple innovations such as using a ceiling fan or a bicycle mechanism (two wheels) to mechanize their spinning tools.[28] The high percentage of family workers in this sector, where the weaver is a man who is the one to receive a payment for the finished product, and women being confined to the pre-weaving activities, would suggest that a larger proportion of women are more likely to be unpaid family workers.

One could argue that improved technology in the handloom branch holds potentially larger employment opportunities for women than the formal textile industry could provide since handlooms are located in rural areas where the majority of women lives. However, the competition from men, based on the traditional division of labour, constitutes a serious barrier to women's economically rewarding participation. Thus it is critical that government policies support this sector development not only in fields of finance, technology, marketing, training, and supplies of yarn, but also aim at providing women with an equal access to this type of services.

3.3 The garment sector

The development of the garment industry sector is a rather recent phenomenon, starting in the late 1970s. The spontaneous and rapid growth of the industry was brought about by a combination of domestic and foreign interests at the time when garment exporting industries in Asia were hit by the quota system imposed by the USA and the EEC countries. It was also the time when labour cost in Asian garment exporting countries increased eroding their low cost comparative advantage and increasing the pressure for restructuring and relocation. Local investors in Bangladesh were looking for new investment opportunities and the Government was hard pressed to reduced its trade deficit and create employment.

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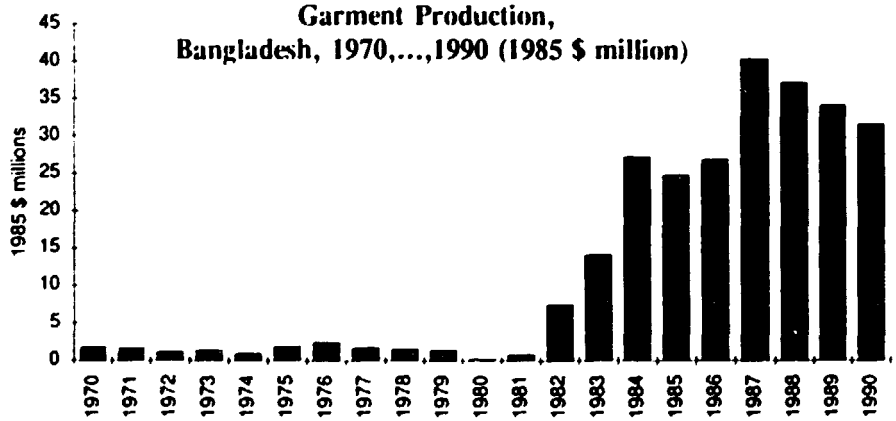
[28] Evidence provided by surveys done in parts of India revealed that the use of a 'bicycle mechanism' can reduce working time to one-forth of what it is with one wheel. See p. 95 in A.S.A. Beud "Forms of Production and Women's Labour: Gender Aspects of Industrialization in India and Mexico", published thesis, Eindhoven, 1989.

All these factors, together with the lack of local demand for western type of garments, contributed to the establishment of the industry not as a natural extension of the textile branch motivated by an import substitution strategy but rather as an independent enclave favoured by export promotion policies. The type of enterprises established were export oriented, producing large quantities of cheap clothing to order by international distribution chains. The domestic value added was limited to the cost of labour since all other inputs were imported. The low cost of labour, an unutilized export quota to EEC and USA, and very favourable conditions offered to foreign investors, including the infrastructure in the Export Processing Zone (EPZ) established in 1983, have attracted investment of international subsidiaries of ready-made clothing enterprises and relocation from the Newly Industrializing Countries (NICs) in Asia.

The number of establishments rose rapidly reaching 450 operating units in Dhaka alone by early 1985 employing at peaks up to 100,000 workers.[29] In 1990 there were 1,000 registered units employing 500,000 workers.[30] The work force composition is almost 90 per cent female. This sudden new employment opportunity presented a rare and welcome chance for women to improve their economic and social status. From the observations and reports about the working conditions and wages paid to women one is tempted to say that for women in Bangladesh the gain in social status was much higher than was their simultaneous economic advancement.

Although the reliability of existing statistical data, that include a number of pure estimates, is questionable, there is a clear indication of the rapid increase in output of garments since the early 1980s. The output jumped from about US $1,5 mill in the 1970s to US $ 7.5 mill in 1982, climbed to US $ 40.3 mill in 1987 but declined to US $ 31.5 mill in 1990 (see Figure 3). Increases in output are closely related to increases in garment exports which have increased, in current prices, from US $ 21 million in 1983 to US $ 580 million in 1989.[31] The contribution of garment exports to the total manufacturing export rose from less than 1 per cent in 1980 to 44 per cent in 1987 which surpassed the figures for textiles in that year (see Figure 4). However, contribution of the industry to both total manufacturing output and value added has, even in the best years, never been much over 1 per cent. This is much lower compared to the about 30 per cent contribution of the textile sector. The value added per worker is also much lower in the garment industry, about half of that found in the textiles, indicating an even lesser degree of automation and technological development.

Fig. 3: **Garment Production, Bangladesh, 1970,...,1990 (1985 $ million)**

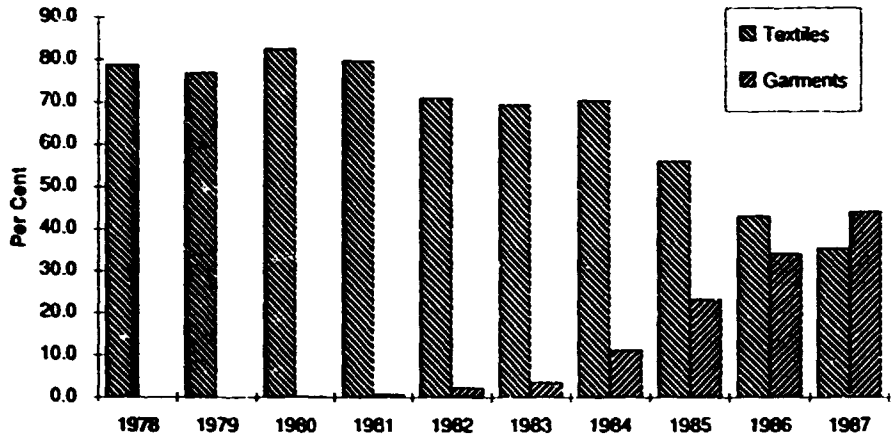


[29] Hameeda Hossain, Roushan Jahan and Salma Sobhan 'Industrialization and Women Workers in Bangladesh' in Noeleen Heyzer ed. "Daughters in Industry", APDC, Kvala Lumpur 1988.

[30] Figures quoted by the Ministry of Industry at a seminar on Textile Industry and the Role of Women, Dhaka in October 1991.

[31] UNIDO data base

Fig. 4: Share of Textile and Garment Exports in Total Manufacturing Exports, Bangladesh, 1978,...,1987



All garment export production in Bangladesh is organized on a sub-contracting basis from abroad. This means that the order is specified in terms of quantity, product design and markets. Local production is confined primarily to the assembly stage. Mechanization of production is limited to the use of simple, operator-guided, electric cutting machines, and basic electric sewing and accessory type of machines. Cheap labour is used extensively as a substitute for mechanized moving, material feeding, transportation and packaging. These are common features for production in Dhaka and the EPZ. However, there is a difference in the age of machine models used, training practices and occupational division based on gender bias.

Local establishments in Dhaka extensively use second-hand machines, and there has not been any upgrading or replacement by more advanced models since the original installation. The expansion in the 1980s has been of the horizontal type, i.e. using the same technology and producing similar type of products, mainly shirts and jeans. Training is done on the job and kept to a minimum of 1-2 weeks, but for wage calculation purposes the apprenticeship of an operator could be extended up to six months. The competition for skilled labour, i.e. trained machine operators, is high, contributing to high employee turnover, and entrepreneurs are reluctant to spend money and time to train their workers for fear of losing them to their competitors. Thus there is, for example, little interest shown for ILO-initiated courses for skill upgrading of workers due to employers' reluctance to release and compensate workers attending training. The wage differential between a helper and an operator is substantial. This explains the high demand for privately organized training courses in basic sewing skills the costs of which are covered by trainees. It is a common practice to employ men for cutting, supervision and often ironing. This is partly justified by physical requirements involved when moving material and weighty equipment. The application of hydraulics etc. will make these arguments obsolete.

The situation in the EPZ is a bit different due to the later start, wider experience of the investors, access to more capital and more forward looking strategies. Based on visits and interviews held with the management of four enterprises in the EPZ [32] the following observations were made. The foreign enterprises had more recent models of machines and first attempts at introducing computerized attachments to the sewing machines. There seems to be

[32] The four enterprises were subsidiaries of companies in the Republic of Korea, Hong Kong and Sri Lanka.

much more concern about product quality and personnel training, especially in the Korean establishment, mainly due to the up-market product specialization.

The majority of new employees are young, inexperienced, female workers. Education is not viewed as a prerequisite for recruitment. The training of a machine operator takes up to three months. The Korean establishment even sends trainees, including women, for training to the Republic of Korea and employs Korean women supervisors to train local personnel. The introduction of micro-computer attachments to sewing machines required no additional operating skills. If anything, it made the job of an operator easier. However, the machine setting was programmed by a male expatriate technician. The reason given was the general low educational level of employees, especially of women operators, who would not understand instructions in the manuals. Posts of production supervisors, technicians and management were filled by direct recruitment at that level, exclusively by males from the mother company abroad. The positive attitude of the management towards women as supervisors was very much influenced by their previous experience with women from their own countries. It was quite common in the EPZ to find women as line supervisors, markers and cutters. This was also attributed to the fact that employers prefer women as easy to train, dextrous, cheap, and not politicized labour.

3.4 Conclusions

The review of the textile and garment industry in Bangladesh shows that although the three sectors, textiles, handlooms and garments, have developed independently and during different time periods they all exhibit most of the features to be expected in the initial stage of industrial development. The only divergence from the conceptual framework, described in chapter 1, seems to be in the low level of female employment in the formal textile and handloom sector. The main reason for this was found in the continuous adherence to the traditional division of labour and to some extent also the lack of technology development.

Improvements in technology in the textile sector have been negligible in the last twenty years and the development of skills required for the introduction of new technologies has been largely ignored. This largely explains why the textile sector has not yet made the transition to the second stage of development. An additional reason are the extremely low wages which reduce the pressure for capital substitution to retain the factor price advantage.

Few technological changes were observed in the more recently established garment sector since the early 1980s. From the observations made at the EPZ it appears that when new technologies, new machines, and/or machine parts have been introduced, quality and labour productivity increased, although the increases have not been measured. However, the total labour force has not declined due to labour turnover and the expanding production which created a continuous demand for new workers. A worker displaced by new technology could easily find another job with the same employer or have an option of employment in another enterprise. Thus it could be argued that quantitatively the flow of women into the garment sector has been so large that it masked what little impact there may have been due to changes in technology. This is not to say that there would not be any impact, had there been more profound changes.

It could also be argued that future changes in technology hold a potential for a positive impact on women in terms of increased employment possibilities in the textile sector, improving working conditions, skills and wages in the garment sector, and increasing employment opportunities through the possibility of decentralized, home-based production. However, these

changes would have to be accompanied by changes in traditional patriarchal values persistent in recruitment, government labour laws, and attitudes affecting women's access to education and training. It is the social norms based on tradition and religious values which are reportedly more feared as a stumbling block for enhancing women's economic status than technological changes.

CHAPTER 4
THE TEXTILE AND GARMENT INDUSTRY IN THAILAND[33]

The growth of the textile and garment industry has been an important contributor to the manufacturing development in Thailand. Selective government policies have targeted the different sections of the industry for investment promotion, import protection and export promotion since the middle of the 1950s. The period 1954 to 1962 was marked by local investment promotion in the spinning and weaving production as part of an import substitution strategy which was in force till 1967. The garment section was neglected in the import substitution period in the 1960s due to the low local demand.

The Investment Promotion Act of 1962 encouraged foreign investment and general re-orientation towards export promotion. Together with additional measures introduced in 1967 these policies turned the negative trade balance in total textile and garment products into a surplus by 1973. The development of the garment industry, facilitated by profits made in the textile industry and favourable local and foreign market conditions, started in the 1970s but it was in the 1980s that the industry recorded an explosive growth and gained economic importance as an export earner.

The development of the textile and garment industry thus can be characterized by three periods: a period of growth for import substitution; a period of growth and expansion as an export industry; and presently a period of shifting emphasis on garment exports with higher value added and quality, and upstream integration. For the analysis of the present state of the industry, a distinction between the textile and the garment sector is made to capture the differences in the pace of development and technological changes affecting the role of women.

4.1 The textile branch

The textile industry, originally based on domestic production of raw material (cotton and silk), has developed from a cottage type production into small and medium size as well as large-scale establishments in spinning, weaving and knitting. An important impetus came in 1954 with the Ministry of Industry's Investment Promotion Act for spinning, weaving and dyeing that resulted in the automation of the production of cotton yarn and fabrics. The total capacity recorded in 1985 was 2 million spindles with a high concentration in 60 mills of which only 9 had a size below 10,000 spindles; about 93,700 looms divided between 62 large-scale factories and about 450 small- and medium-sized units; 71 large- and many more small-scale knitting plants, and over 300 dyeing and printing units.[34] The supply of locally produced cotton now satisfies less than 10 per cent of the industry's demand, but the shift is towards production of man-made fibres such as polyester, nylon and rayon, where all inputs are imported.

The growth of the industry in terms of output and value added is illustrated by Figure 5. The industry contributes about 11 per cent to the total manufacturing output and about the same to the total manufacturing value added. In the period 1972-1978 textile exports reached a peak of almost 15 per cent of total manufacturing export earnings in 1973 but decreased to

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[33] This chapter is primarily based on a case study issued as UNIDO working Paper "Thailand's Textile and Clothing Industry: the Role of Women", November 1990.

[34] UNIDO "Industrial Restructuring Policies in Developing Asian Countries With Particular Attention to the Textile and Garment Industry", PPD. 104, December 1988.

8-9 per cent in the 1980s. Capital-intensive technology, especially in the man-made fibre production, and the development of intermediate and capital goods industries substituting previously imported machine parts and other inputs have had a positive effect on the productivity of the industry. The industry's manufacturing value added per worker increased from US $3,900 in 1970 to US $ 7,500 in 1990 (see Figure 6).

Fig. 5: Textile Output and Value Added, Thailand, 1970,...,1990

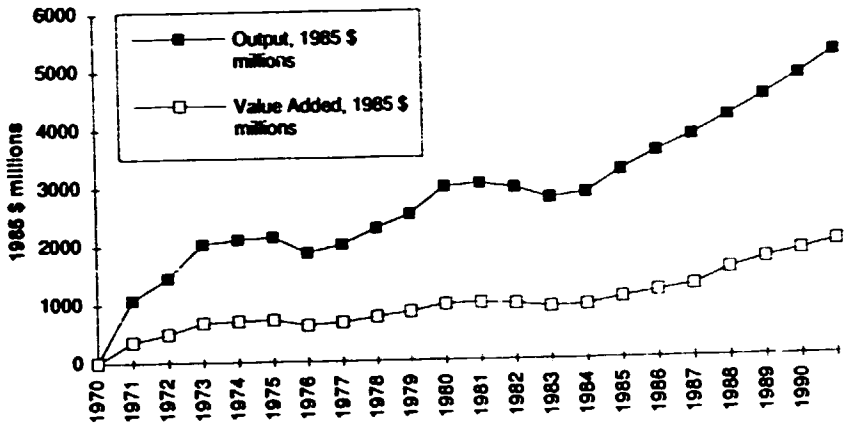
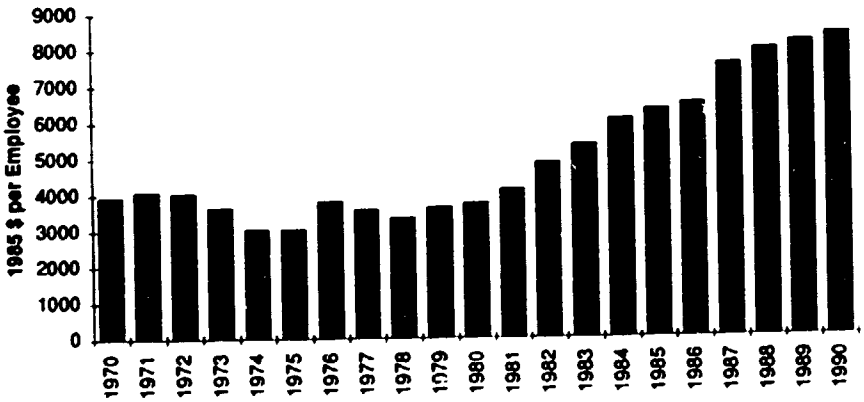


Fig. 6: Value Added per Textile Employee, Thailand, 1970,...,1990



The industry has expanded mainly in size although signs of product diversification from natural to man-made fibre, and from standard mass produced products to high grade products is apparent. The technological developments in the textile sector have been closely associated with product specialization, size of establishment, foreign investment and market destination, as illustrated by the empirical evidence below. Government investment promotion and import policies together with their focus on employment creation have also influenced these developments.

The spinning and weaving production has been sheltered from the competitive forces first by import protection and later also by direct export subsidies. The technology in natural fibre manufacturing is still oriented towards standard mass production destined primarily for local consumption, border trade or exported as grey cloth for finishing abroad. The large number of small- and medium-sized enterprises are still using machinery from the 1960s and replacement and/or expansion relies on imports of used equipment from Hong Kong, the Republic of Korea and Taiwan Province of China. The lack of integration of the spinning, weaving and dyeing sections represents additional problems in the upgrading of power looms and dyeing equipment. Only large-scale producers specializing in higher quality products see advantage in the costly investment in shuttleless looms and dyeing equipment.

The manufacturing of synthetic products has from the start demanded a capital-intensive technology. The technology was transferred as a foreign investment package deal including management and marketing. Japanese capital and know-how have played a dominant part in this respect. The present Japanese affiliated manufacturers have found their competitive edge in increasing the sales proportion of specialized and high quality products.

In contrast to an oligopolistic organization of the production of cotton and synthetic fabrics, the silk manufacturing is characterized by a high degree of decentralization and is heavily dependent on sub-contracting activities in rural areas. This is for a large part related to the prevalence of a traditional technology in the production of silk yarn and fabrics. The major obstacle to the automation of weaving is the nature of the raw silk which is uneven in texture and the absence of a technology to accommodate this. The Thai market is too small for machine producers in Europe and Japan to invest in a technology which could be used only in Thailand. Thus attempts are made to smoothen the silk thread (which means losing one of the distinctive characteristics of Thai silk) rather than to locally develop an appropriate technology.

Experiments with imported hybrid silk worms are supported by government research institutions and extension staff jointly with large silk manufacturers. An example of the modernization of spinning processes recently introduced in the most famous Thai silk company, Jim Thompson, shows encouraging results in quality and productivity improvements. An intermediate and high technology for spinning, imported from Japan and the Republic of Korea, has been successfully integrated with the company's experimental agricultural research station and subcontracting system of local producers of silk cocoons. The silk yarn production supplies the company's weaving units which still use traditional hand looms and rely extensively on a system of small subcontractors. There has been very limited technological change in the weaving section, confined primarily to improvements in the handloom stability allowing for higher speed.

Manufacturing employment in the textile sector more than doubled between 1970-1990, from 91,000 to 210,000 workers.[35] The percentage of women in the textile labour force could be

[35] Source: UNIDO data base. The UNIDO data series is largely consistent with the data for 1984-1986 from the Thai Textile Manufacturing Association, however for the period 1987-1988 the Association's figures are 26 000 and 57 000 higher than UNIDO's. No data beyond 1988 are available from the Association.

only roughly estimated to be about 80 per cent.[36] In the absence of gender specific data in national and international publications on textile employment, it is very difficult to statistically document the impact of technology change on the female total employment and their proportionate representation. Nonetheless, it is safe to say that the technological changes in the standard mass production have been few and the potentially negative impact of automation resulting in labour savings have been more than offset by the sector's expansion in size. In addition, the introduction of a new spinning technology in the traditional silk production holds potential for creating new industrial employment opportunities for previously low paid female subcontractors and/or family labour. Moreover, the development of the knitting section of the textile industry has led to a rapid increase of employment reaching 40,000 in 1988 from 23,000 in 1984.[37] However, the real number is believed to be much higher, as many of the small-scale units are not registered. Most of the employees are women.

Examination of the female occupational structure in the textile industry reveals the same pattern found in other developing countries.[38] With very few exceptions, the top management positions are all held by men. Most women are confined to the production worker category attending machines. Their mobility does not go higher than to a foreman/supervisor of a production line. Section chiefs and shift leaders are recruited from the ranks of technicians responsible for repairs and maintenance. Positions of production manager and above are filled by direct recruitment of graduates from colleges offering technical training. The reasons for low female occupational mobility can be traced to the lack of a technical background of women and the general acceptance by men and women that production tasks are more suited to women, rather than to open gender discrimination based on social and religious values. As a general pattern the female manufacturing labour force has the highest percentage of women with no education and the lowest proportion of women with higher education. The opposite is the case of the male manufacturing labour force (see Figure 7). Although the percentage of women in secondary, vocational and high education increased in the last twenty years, the percentage of women in the field of industrial technology is still less than 3 per cent.[39]

The manufacturers of standard mass products do not consider improvements from using new machinery or the latest technology to be worth the investment required. Thus the main concern is to make the best use of the existing machinery and the relatively cheap labour. At present more efficient use of machinery, improved quality and sales capability are important competitive factors. This creates demand for more skilled personnel such as technicians on the factory floor to improve the lay-out of production flows and quality control; mechanics to repair and maintain aging machinery; and marketing and management expertise. The shortage of these skills is already apparent and creates serious problems for small and medium firms which cannot compete with large firms in paying high wages. An international comparison of labour costs in the textile sector presented in Table 5 shows the increases since 1980 and puts Thailand amongst the top six countries recording the highest increases from 1989 to 1990. Although

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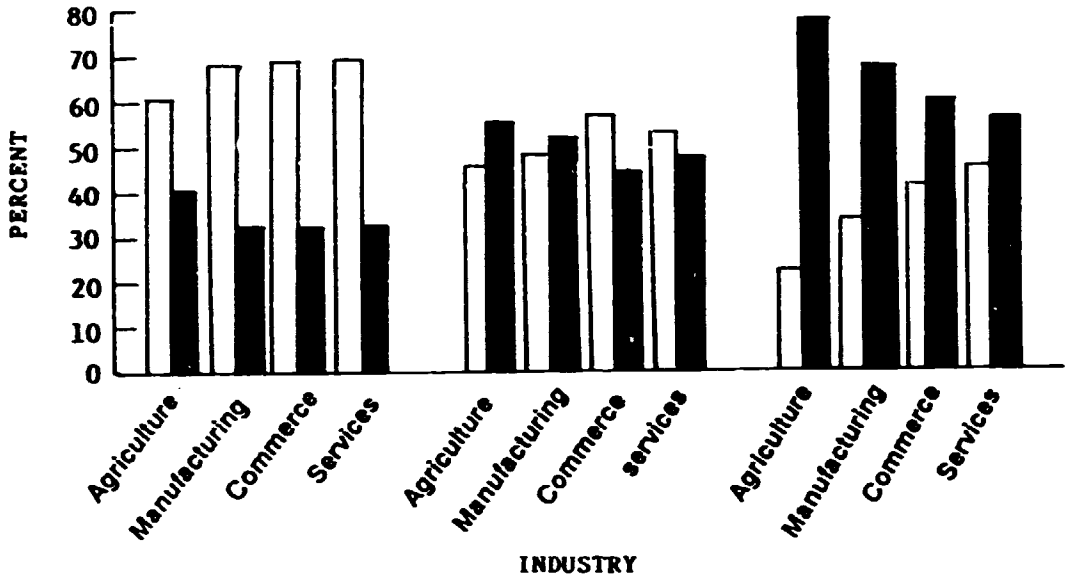
[36] The estimate is based on a survey of 13 medium and large scale textile firms included in "Young Women Workers in Manufacturing: A Case Study of Rapidly Industrializing Economies of the ESCAP Region", ESCAP, Bangkok, 1987 and "The Role of Women in the International Division of Labour: The Case of Thailand" by D.V. Porpora, M. H. Lim and U. Prommas in Development and Cange, Vol. 20 1989.

[37] Thai Textile Manufacturing Association

[38] "Young Women Workers in Manufacturing: A Case Study of Rapidly Industrializing Economies of the ESCAP Region", ESCAP, Bangkok, 1987

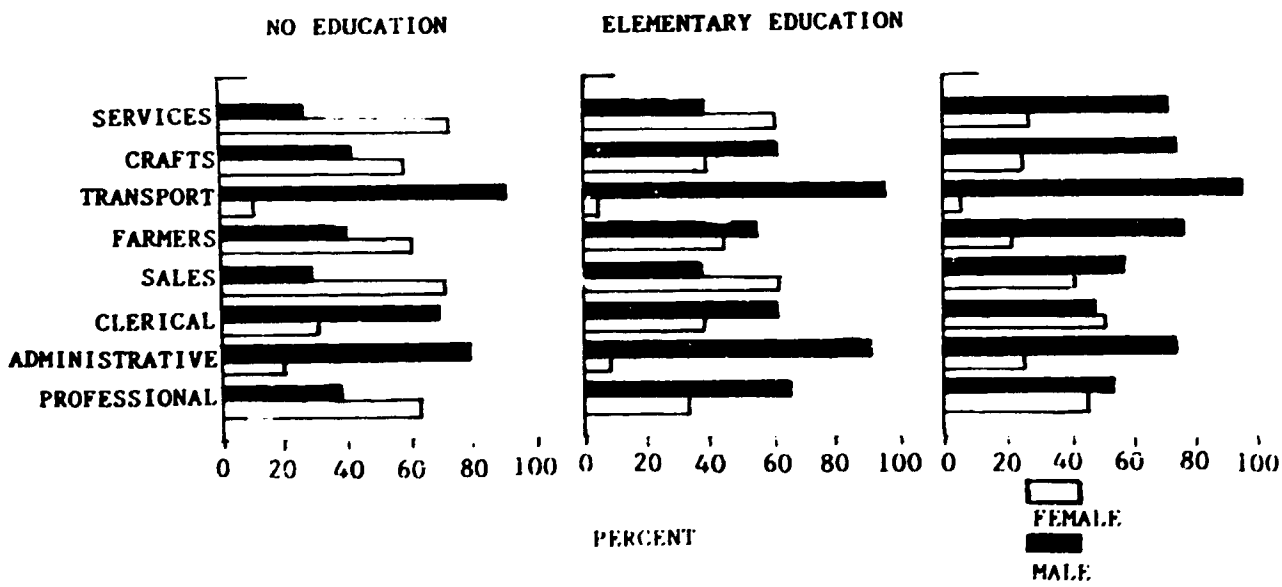
[39] Thailand Development Research Institute " Thailand Women's Information Kit", Bangkok, July 1989.

Fig.7a: **Educational Attainment by Industry (1986)**



In the various industries and occupations, there is a higher percentage of women with no education, while there is a lower percentage of women with higher education.

Fig.7b: **Educational Attainment by Occupation**



Source: Labour Force Survey, May 1986, National Statistical Office, Thailand

Table 5: **International Labour Cost Comparisons in Spinning and Weaving (US$/hr)**

	Spring 1980	Spring 1984	Spring 1987	Spring 1988	Spring 1989	Summer 1990	% change 1990/89
Switzerland	9.65	8.65	15.70	17.15	14.58	19.22	31.89
Sweden	10.43	7.91	13.69	14.20	14.60	18.70	28.08
Denmark	9.12	7.97	13.46	15.07	14.08	18.35	30.33
Belgium	11.82	8.84	13.66	15.07	13.42	17.85	33.01
Netherlands	11.68	9.80	13.75	15.62	14.06	17.84	26.88
West Germany	10.16	7.54	12.98	14.67	13.17	16.46	24.98
Norway	9.62	9.66	12.87	14.65	13.62	16.37	20.19
Italy	9.12	6.35	12.67	13.81	13.03	16.13	23.79
Austria	6.42	6.76	12.59	14.10	12.45	15.70	26.10
Finland	5.62	6.05	10.70	12.23	11.79	14.44	22.48
Japan	4.35	6.28	11.99	14.93	13.98	13.96	-0.14
Canada	6.25	8.50	9.85	10.78	11.79	12.83	8.82
France	7.91	6.07	9.99	10.88	9.82	12.74	29.74
Australia	...	7.85	7.83	9.07	9.33	10.34	10.83
UK	5.75	5.46	7.09	8.43	8.18	10.20	24.69
USA	6.37	8.60	9.24	9.42	9.71	10.02	3.19
Republic of Ireland	5.13	4.20	6.70	7.39	6.94	9.15	31.84
East Germany	...	...	...	...	...	8.28	...
Spain	4.90	3.87	4.78	5.69	5.65	7.69	36.11
Israel	...	...	...	...	...	7.09	...
Greece	3.49	4.30	4.00	4.47	4.32	5.85	35.42
Taiwan	1.26	1.64	2.09	2.94	3.56	4.56	28.09
South Korea	0.78	1.89	1.77	2.29	2.87	3.22	12.20
Hong Kong	1.91	1.65	1.93	2.19	2.44	3.05	25.00
Singapore	0.94	...	...	...	...	2.83	...
Tunisia	1.13	1.21	2.56	2.69	2.37	2.82	18.99
Portugal	1.68	1.28	1.83	2.19	2.03	2.75	35.47
Mexico	3.10	2.62	0.83	1.84	2.11	2.21	4.74
Brazil	...	...	1.62	0.89	1.78	1.97	10.67
Uruguay	0.89	...	1.97	1.69	1.78	1.86	4.49
Turkey	0.95	1.19	1.28	1.01	1.27	1.82	43.31
Colombia	...	2.81	1.66	1.69	1.71	1.71	-
South Africa	...	1.64	0.82	0.86	0.69	1.57	127.54
Argentina	3.33	2.23	1.60	1.24	1.42	1.42	-
Venezuela	...	3.27	2.35	1.27	1.26	1.37	8.73
Morocco	0.85	...	0.74	1.10	1.10	1.28	16.36
Hungary	...	...	...	.	...	1.24	...
Peru	...	...	1.40	1.64	1.13	1.23	8.85
Syria	0.96	3.12	4.29	0.67	0.86	0.94	9.30
Thailand	0.33	0.56	0.58	0.66	0.68	0.92	35.29
Ethiopia	...	0.27	0.29	0.68	0.78	0.87	11.54
Malaysia	...	...	...	0.81	0.82	0.86	4.88
India	0.60	0.71	0.65	0.77	0.65	0.72	10.77
Philippines	...	...	0.57	0.64	0.64	0.67	4.69
Kenya	...	0.53	0.62	0.60	0.54	0.63	16.67
Egypt	0.39	0.90	1.19	0.41	0.45	0.45	-
Pakistan	0.34	0.49	0.37	0.40	0.37	0.39	5.41
China	.	0.26	0.23	0.27	0.40	0.37	-7.50
Tanzania	...	.	..	.	.	0.32	..
Nigeria	.	2.13	0.48	0.39	0.26	0.30	15.38
Indonesia	...	0.23	0.20	0.22	0.23	0.25	8.70
Sri Lanka	.	0.28	0.31	0.30	0.26	0.24	-7.69

Source: Werner International, in Textiles and Clothing in South East Asia, The Economist Intelligence Unit, Report no. 2082, March 1991.

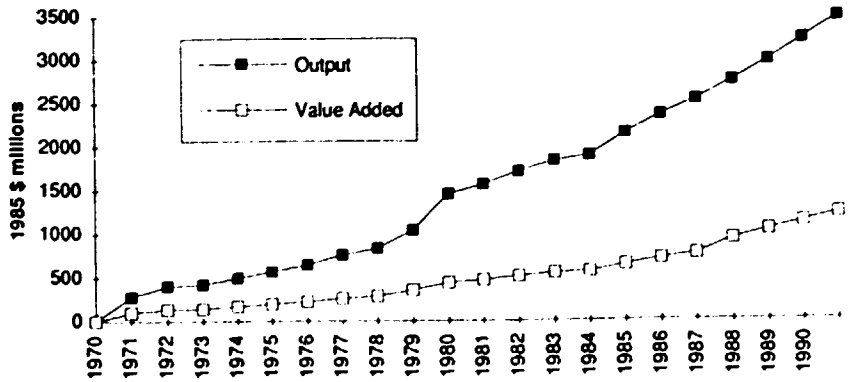
education attainment has increased considerably for all educational levels and also vocational training in the last 20 years, the lack of textile specialization in engineering and business studies is a big drawback.[40]

4.2 The garment branch

The garment industry has developed as a downstream extension of textiles. In 1967 the Board of Investment made the export oriented garment industry a target for promotion and support, in particular by introducing the business tax refund system and exemption from import duties on inputs for export production. A favourable agreement reached with the USA in 1971 provided more favourable market conditions for Thailand compared to the NIEs in Asia. Expansion of the garment sector was also facilitated by the increase in the domestic demand for ready-made garments since the early 1970s. Additional boost came with the devaluation of the Thai currency in 1984 and the appreciation of the Taiwanese dollar and South Korean Won in 1985 which strengthened the price competitiveness of Thai garments and contributed to the expansion of exports.

The growth of the garment industry has been remarkable. The contribution of garments to the total manufacturing output and value added has increased almost three times between 1970-1990, from 2.5 per cent in 1970 to over 7 per cent in 1990.[41] The output has been growing faster than the value added, see Figure 8. One of the primary reasons for this is the increasing value of imported inputs due to the local supply of materials and accessories not being able to keep pace with the demand from the garment industry neither in quantity, variety, nor quality. Over 80 per cent of the production is for export, mainly as consignment by overseas buyers. The export earnings from garments surpassed those of textiles already in 1982. By 1987 the contribution of garment exports to the total manufacturing exports reached almost 17 per cent, over twice the contribution of textile exports, see Figure 9.

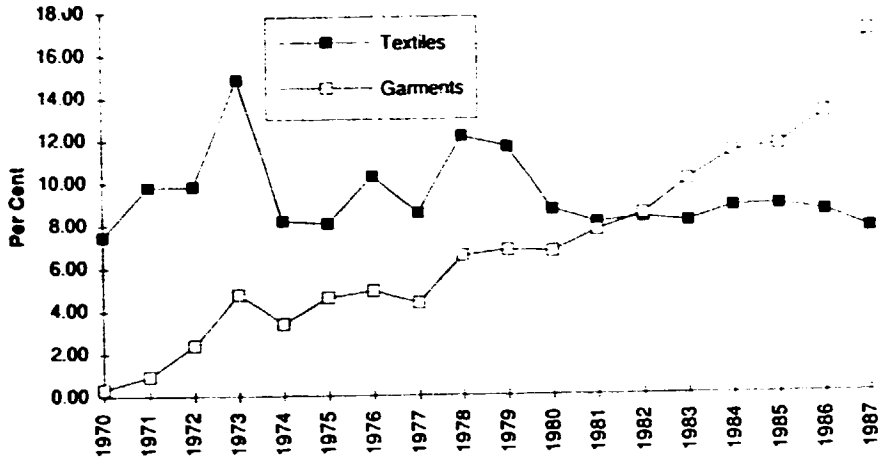
Fig.8: Garments Outputs and Value Added, Thailand, 1970,...,1990



[40] Total enrolments as a percentage of age group increased between 1965 and 1985 from 78 per cent to 97 percent for primary school, from 14 per cent to 30 per cent for secondary school, and from 2 per cent to 20 per cent for higher education. Enrolments in vocational training increased by 56 per cent between 1975 and 1984 from 191 000 to 298 000. (UNESCO)

[41] UNIDO data base.

Fig. 9: Share of Textile and Garment Exports in Total Manufacturing Exports, Thailand, 1970,...,1987



In 1988 there were 57 large plants with 24,000 sewing machines and an estimated 1,000 small and medium-sized units using 180,000 sewing machines.[42] There has been a strong upward trend in the installation of production facilities, mostly sewing machines, since 1984. Most of these machines being old style models from Taiwan Province of China, the Republic of Korea and Japan. Due to 40 per cent duty imposed on imports of machinery, only large-sized establishments engaged in the production of high quality garments are taking the lead in introducing computers for drafting, marking, sewing machine attachments and inventory control. As in the textile sector, the majority of garment production is still of standard type depending on the design and brand names of their customers. However, product diversification introducing original Thai designs is emerging, as is the strive for higher quality products.

The garment branch absorbs the largest proportion of the total textile and garment industry labour force, about 70 per cent. In 1988 the garment section employed about 626,000 people, an increase of almost 50 per cent from 1984, see Table 6. There are no statistical data on women's representation, but data on the percentage share of women in different occupations suggest that there was a substantial increase in women's participation in the category of tailors, dressmakers and related workers between 1973 and 1983. In the urban areas women's share increased from 72 per ent to 80 per cent and in rural areas from 57 per cent to 91 per cent.[43] The absolute and relative increase in women's participation in the garment sector has been to a large extent facilitated by spreading sub-contracting arrangements, both in urban and rural areas, and increasing opportunities for male labour in other manufacturing branches.

The division of labour in the garment manufacturing conforms to a general pattern found in the textile sector where women are the majority of production workers and men are in technical and managerial posts. However, due to an increase in women's enrolment in secondary and higher levels of education and a favourable disposition of the social and cultural

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[42] UNIDO "Industrial Restructuring Policies in Developing Asian Countries With Particular Attention to the Textile and Garment Industry", PPD. 104, December 1988.

[43] National Statistical Office, Report of the Labour Force Survey, July-September 1973, 1983, presented in "Diversification of Women's Employment and Training", ILO, Regional Office for Asia and the Pacific, Bangkok 1987.

Table 6: Textile employment in Thailand, 1984-1988

	1984		1985		1986		1987		1988	
		%		%		%		%		%
Spinning	33,999	5.7	35,213	5.7	35,540	5.5	37,602	5.1	44,176	5.0
Weaving	36,956	6.2	37,028	5.9	37,048	5.7	42,594	5.7	47,084	5.3
Knitting	22,879	3.8	23,781	3.8	25,657	4.0	36,594	4.9	40,145	4.6
Dying & Finishing	20,193	3.4	22,242	3.6	24,173	3.7	28,016	3.8	34,820	3.9
Garment	420,135	70.3	437,982	70.3	457,309	70.4	519,461	70.0	626,042	71.0
Synthetic Fiber	6,577	1.1	7,060	1.1	7,411	1.1	7,913	1.1	8,647	1.0
Sewing Thread	3,489	0.6	3,682	0.6	3,941	0.6	4,262	0.6	4,632	0.5
Fishing Net	6,883	1.2	7,000	1.1	7,260	1.1	7,519	1.0	7,729	0.9
Socks	4,690	0.8	5,028	0.8	5,413	0.8	5,952	0.8	6,667	0.8
Others	41,796	7.0	43,600	7.0	45,523	7.0	52,019	7.0	61,824	7.0
Total	597,597	100.0	622,616	100.0	649,275	100.0	741,932	100.0	881,766	100.0

Source: Thai Textile Manufacturing Association.

environment to women's employment outside their homes, it is not unusual to find an increasing number of women as managers of large family businesses and small enterprises. The situation in larger enterprises is different due to recruitment and promotion policies where technical college or vocational training background provides either direct entry or promotional possibilities into the management rank.

The introduction of multifunctional machines to raise productivity and quality demands more than operators' skill upgrading which can be done by on-the-job training. Technical and computer knowledge is a complementary requirement to make the best use of the new machines' capacity. These skills can hardly be completely learned through on-the-job training. The shortage of capable control engineers for the design of production lines and process settings, as well as mechanics for repairs and maintenance is already apparent. Present scouting of manpower in these occupations as well as shortages of designers, markers and cutters force the wages up which may be affordable only for large enterprises which also resort to the use of foreign expertise as a gap-stopping measure. These shortages in the supply of skill labour push the wages up, a fact which is eroding the cost comparative advantage of the Thai garment industry and mounts up the pressures for restructuring towards higher value added.

4.3 Conclusions

The review of the textile and garment industry development in Thailand shows that Thailand has not only reached a more advanced stage of industrial development than Bangladesh but also that it is ripe for a new phase of restructuring. Diversification of the manufacturing base, increased technological capabilities as a result of a general increase in educational standards and foreign investment associated with transfer of technology, and the positive role of the Government facilitated the transformation of the textile and garment industry from being import- to becoming export-oriented. However, the historical trend of expanding volume of standard mass production based on labour intensive and low skill technology is now being exhausted. Changing export market conditions and internal competition are increasing pressure on the industry to streamline and specialize in new lines of production

and modernize its technology. Although there are already signs of this new trend both in the textile and garment sector, the major changes are still to come.

The evidence of technology changes in the traditional silk production as well as the extensive use of subcontracting indicates rather a positive impact than a negative one on women. In addition, the relatively low wages and a general preference for female labour make the textile and garment industry increasingly appear as an important provider of female employment opportunities both in absolute and relative terms at this stage of development. However, this conclusion refers to the female participation rate and not to the improvement in wages or occupational advancement.

Demonstratively the demand for technicians and mechanics is increasing, so is the demand for skilled cutters, markers and designers. Wages for this type of personnel have been rising as the demand exceeds the supply. Thus the differential between wages of operators and technical workers increases. Since the female manufacturing labour force generally has less formal technical education, it is the male workers who benefit from this situation. This is also consistent with the hypothesis in the conceptual framework described in chapter 1.

CHAPTER 5
THE TEXTILE AND GARMENT INDUSTRY IN INDONESIA[44]

5.1 The textile sector

The textile industry has a long tradition in Indonesia, especially in the production of handwoven and printed batik fabrics. However, the development of a modern textile industry in general, and clothing industry in particular, is a relatively recent phenomenon. It was in the context of import-substituting industrialization in the 1970s that the expansion and modernization of the textile and garment industry took on substantial dimensions.

The installed capacity in the textile sector grew from 0.5 million spindles in 1970 to 2.5 million in 1985 and the number of mechanized looms increased from 35,000 to around 103,000 in the same period.[45] The total employment in the textile and garment industry, including small-scale enterprises, is estimated to have increased three times between 1970 and 1985, from 0.5 million to 1.5 million, representing a quarter of total manufacturing employment.[46] However, figures in official industrial statistics, excluding small-scale enterprises, are about 370 000 in 1985.[47]

Real output and value added of the textiles have increased almost ten times between 1970 and 1990, see Figure 10. However, the share of textiles in the total manufacturing output and value added has been declining from the middle of 1975, while the share of textile exports in total manufacturing exports has been increasing since 1978, see Figure 11. The declining relative importance of textile production may be explained by a faster growth of other industrial branches, especially basic metals, garments, chemicals, and wood products. The increasing importance in exports reflects the transition from import substitution to export promotion introduced by the Government in the late 1970s and the first half of the 1980s.[48]

The present textile production covers a comprehensive range of both natural and synthetic materials. Product diversification has been facilitated by the local availability of oil and timber, primary raw materials used in the manufacture of man-made fibres. Technology transfer trough foreign investment has also played an important part. Import substitution of synthetic materials now satisfies 80 per cent of total domestic demand for man-made fibres. The exception is acrylic fibres which have remained highly import-dependent. On the other hand, cotton production satisfies only 10 per cent of the local demand for natural fibres.[49]

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[44] This chapter is based on a case study issued as UNIDO Working Paper "Technological and Organizational Change in the Clothing Industry. Implications for Indonesia's competitiveness with special emphasis on human resource requirements and the role of women", 1992. The examination of the textile sector is based on secondary sources.

[45] The number of handlooms which is excluded has decreased from 160 000 to about 60 000 in the same period. For details see Gherzi Textil Organization: "Indonesia Textile Industry Study", May 1987.

[46] Gherzi Textil Organization "Indonesia Textile Industry Study", May 1987.

[47] Yearbook of Labour Statistics, ILO 1991.

[48] Important export encouraging measures include the introduction in 1978 of a Certificate of Export for the reimbursement of import duties and sales tax on inputs for export production, devaluation of the rupiah in 1983 and again in 1986, establishment of Export Processing Zones and other foreign investment incentives strengthened by the "May 6 package" of 1986, supportive advisory and information services for export marketing, as well as a liberalization of the domestic financial system and changes in the tax structures.

[49] "Indonesia Textile Industry Study", Gherzi Textil Organization, May 1987.

Fig. 10: Textile Output and Value Added, Indonesia, 1970,..,1990

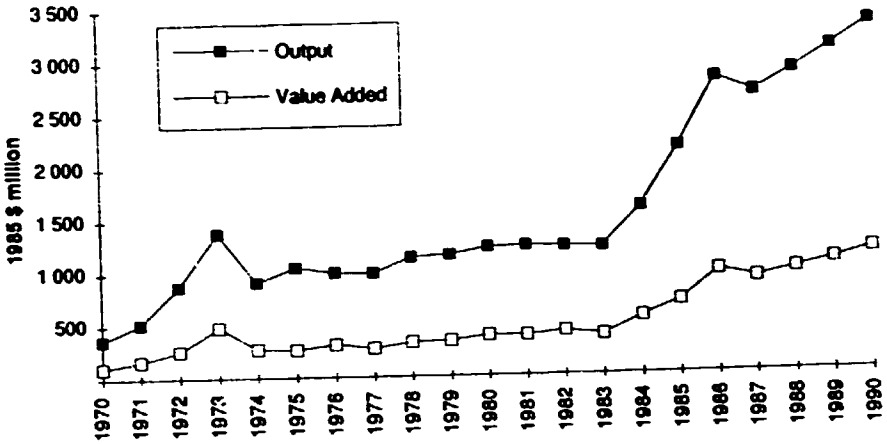
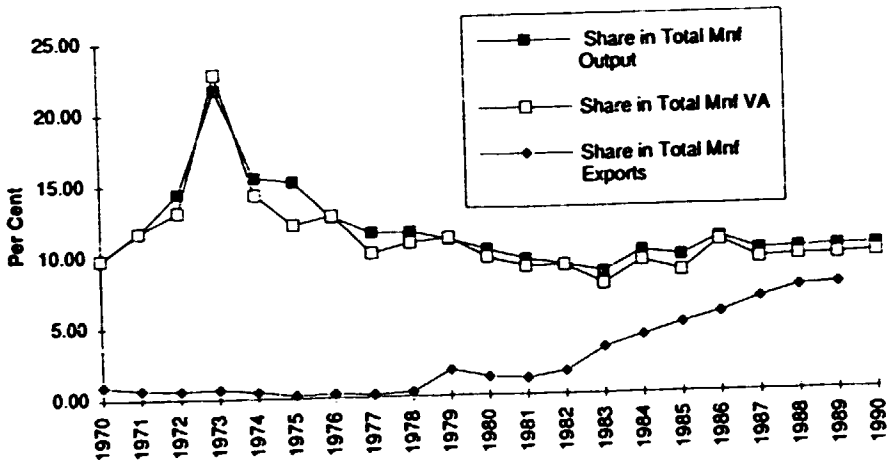


Fig. 11: Share of Textiles in Total Manufacturing Output, Value Added, and Exports, Indonesia, 1970,...,1990



The branch is characterized by a nucleus of big, integrated plants and a large number of medium- and small-sized enterprises, especially in weaving.[30] The size of plants affects not

[30] About 47 per cent of the installed spindles are integrated into the weaving process or weaving and processing. The remaining 53 per cent specialized in yarn production for sale. Only 18 per cent of the registered weaving capacity is integrated in spinning plants and an even lower percentage, 13 per cent is integrated into both spinning and processing. There is little or no integration between weaving mills and apparel manufactures. Ref. Gherzi Textil Organization, 1987.

only the possibility of forward and backward linkages but also the application of different types of technology determining the type, quality and price of the final product. An assessment of the technology state in spinning and weaving made in 1987 reveals that whereas 45 per cent of the spinning machinery was 10 years old or less, the corresponding percentage for looms was only 28 per cent.[51] It was also estimated that only about 5 per cent of the registered looms were of the shuttleless type.

The lack of possibilities to benefit from the increased output thanks to a modernized technology and economies of scale has been compensated by extensive utilization of cheap labour and a horizontal expansion of production. Thus in spite of the smaller size of production units and a higher level of labour intensity in Indonesian enterprises compared to those in more advanced textile producing countries, the significant labour cost differentials redress the imbalance in international comparison of average labour productivity. Labour costs in the textile industry have remained almost unchanged throughout the 1980s securing Indonesia comparative cost advantage over other Asian textile producers such as Thailand, Malaysia and the Philippines, see Table 5.

Foreign investment, either private or in the form of joint ventures, has facilitated both technology transfer and skill development. This is particularly pronounced in the man-made fibre production where six out of eleven registered firms have been established under the Foreign Investment Law. A sample survey of these activities in 1986 showed high levels of efficiency, capacity utilization and quality standards as well as excellent multi-level technical and management training programmes.[52].

In spinning, only 28 per cent of the installed spindles are owned by joint-venture companies compared to 48 per cent in the hands of private nationals; 22 per cent are owned by the public sector.[53] As a result of a phased modernization programme, it is common to find in one establishment a mixture of machines of different ages with improved design but using the same technology principle.

Weaving and processing (dyeing, printing and finishing) are less modernized and comprise still a large number of cottage type enterprises. These activities have relatively old equipment including traditional hand looms and hand printing equipment associated with the traditional production of batik fabric. There is a very low formal training input. Most of the traditional skills are passed on through informal apprenticeships using the family and/or kinship ties.

There is no gender specific information available regarding employment and occupational structure in the modern textile branch. However, an examination of available employment data provides some basis for tentative conclusions with respect to the position of women in this branch. In view of the problems encountered with different definitions of employment, sizes of enterprises and age group classifications used, two primary data sources have been used for time series analysis.[54] The UNIDO industrial statistics data base has been used to determine the changes in the manufacturing employment recorded and/or estimated for the medium- and

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[51] Gherzi Textil Organization "Indonesia Textile Industry Study", May 1987.

[52] Gherzi Textil Organization "Indonesia Textile Industry Study", May 1987.

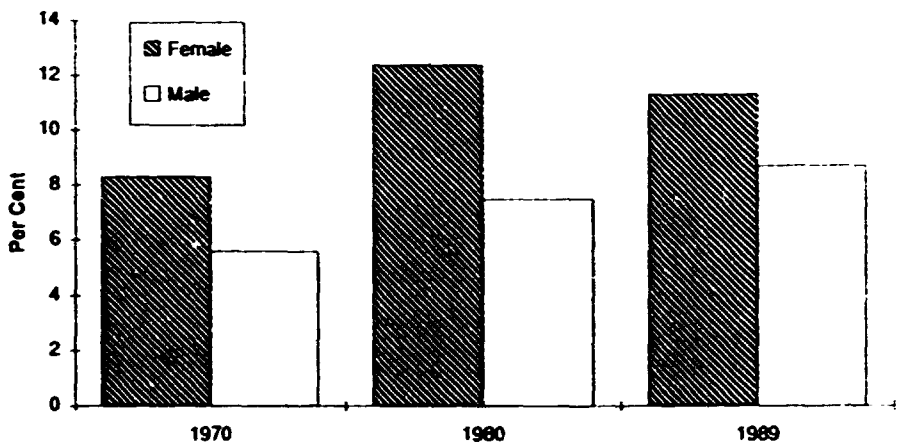
[53] Gherzi Textil Organization "Indonesia Textile Industry Study", May 1987.

[54] Problems encountered are connected with the use of different primary sources such as population censuses and labour force sample surveys or industrial statistics based on registered firms classified either according to employment size or the technology level.

large-scale enterprises with 20 or more employees. To compensate for the lack of gender differentiation, ILO data have been used to examine the changes in the magnitude and structure of the economically active female population.

The importance of manufacturing as a source of employment has not changed considerably in the last twenty years. In 1970 only 6 per cent of the economically active population were in manufacturing, 9 per cent in 1980 as well as in 1989.[55] Figure 12 shows that manufacturing employment as a proportion of the economically active population has increased faster for females than males between 1970 and 1980, but the reverse appears to be the case in 1989.[56] This could be explained by increased absorption of the male population into the educational system and men having more attractive employment opportunities in other sectors, thanks to the oil boom and expanding public services in the 1970s. During the 1980s expansion and diversification of manufacturing production in the chemical, metal and mineral branches absorbed a larger number of male rather than female workers. It appears that women have found more opportunities for employment in the service sector, especially in trade and social services. The proportion of the economically active female population in the service sector has been increasing from around 30 per cent at the beginning of 1980s to over 50 per cent towards the end of 1980s.[57]

Fig.12: Share of Manufacturing Employment in the Economically Active Population by Sex, Indonesia, 1970, 1980 and 1989



Source: ILO 1991.

Proportionate female representation in the total economically active population engaged in manufacturing appears high and slightly rising from 42.6 per cent in 1970 to 45.4 per cent in 1980, and to 46.5 per cent in 1989.[58] However, this is primarily due to the inclusion of a large

[55] ILO Yearbook of Labour Statistics 1991, Table 3B.

[56] ILO data analysed in Achievements of the United Nations Decade for Women in Asia and the Pacific, ESCAP, Bangkok, 1987

[57] ILO Yearbook of Labour Statistics 1991, table 3B.

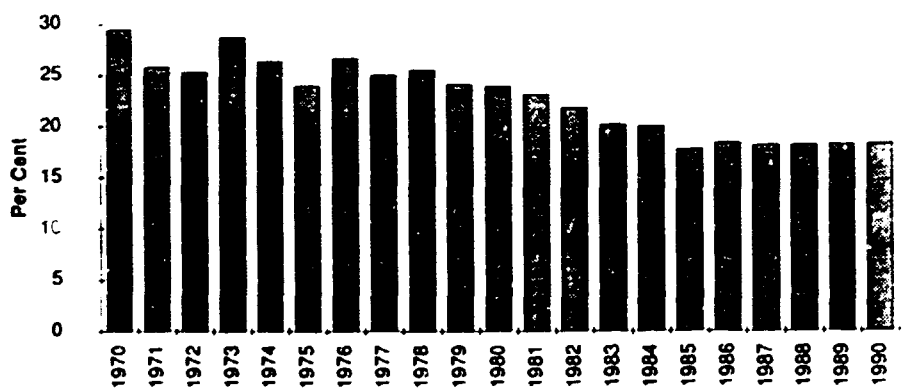
[58] ILO Yearbook of Labour Statistics 1991, table 3B.

proportion of rather traditional, as opposed to modern, manufacturing activities found primarily in rural areas.[59] This explanation is also supported by the data regarding employment status indicating almost twice as many economically active women counted as unpaid family workers than those in the employee category where only 6 per cent are found in manufacturing.[60] Thus caution has to be exercised in using data on the economically active female population, based on a labour force sample survey rather than an establishment survey as an indicator of women's participation in what may be called the modern industrial labour force.[61]

Assuming that the available statistical data do not offer the most reliable reflection of the actual situation, only general observations could be made. It appears that both for men and women the manufacturing sector has not as yet provided any substantial employment, especially in the modern industrial sector with establishments of 20 or more employees. It also appears that for women, manufacturing activities in the traditional sector as well as increasing opportunities in the service sector constitute a more important source of employment. The latter is more apparent in the 1980s than in the 1970s.

The following examination concentrates on employment in the textile industry and its potential contribution to manufacturing employment in the modern sector. Industrial statistics based on a survey of establishments with 20 or more employees shows that the average annual rate of growth of manufacturing employment was 7.7 per cent in the period 1970 to 1990, while the employment in textiles has grown on average by 5 per cent per year during the same period.[62] The share of textile employment in the total manufacturing employment thus has been declining as indicated in Figure 13. This also implies that employment in other industrial branches grew faster than that of the textile sector.

Fig.13: Share of Textile Employment in Total Manufacturing Employment, Indonesia, 1970,...1990



[59] The analysis of the period 1970-1980 shows higher participation rates for economically active females in rural compared to urban areas. See Lorrein Corner in Women's Economic Participation in Asia and the Pacific, ESCAP 1987 and Achievements of the United Nations Decade for Women in Asia and the Pacific, ESCAP 1987.

[60] ILO Year Book of Labour Statistics 1991.

[61] This is particularly the case of Indonesia where manufacturing employment presented in industrial statistics includes enterprises of 20 or more employees, thus excluding the large small-scale sector. In 1989, for example, total manufacturing employment in large- and medium-scale enterprises accounted only for 26 per cent of the economically active population in manufacturing and about 48 per cent of the economically active population classified by ILO as manufacturing employees.

[62] UNIDO statistical data base.

Reasons for the slower growth of employment in the textile branch compared to other manufacturing branches could be related to its increasing labour productivity. This is plausible given that both textile output and value added grew faster than textile employment.[63] Statistical evidence indicates an almost threefold increase in the value added per worker in the registered establishments with 20 or more employees between 1970 and 1990.[64] This is also supported by results from a survey on the growth of the manufacturing sector between 1975-1986 which reveal that 76 per cent of the textile growth has been attributed to an increase in productivity rather than employment.[65] This is the highest score among all industrial branches (see Table 7). The survey also indicates that although enterprises of all sizes recorded higher value added primarily through increases in real labour productivity rather than employment, this is more pronounced in the case of small firms. This could be interpreted as an indication of relatively slower growth of employment opportunities in the small establishments compared to large and medium firms.

Given that the majority of economically active women in manufacturing are found in the traditional, informal sector type of activities, this most likely also applies to their participation in the textile sector where women have been traditionally involved in weaving and hand printing batik fabrics. The declining number of hand looms from 160,000 in 1970 to less than 60,000 in 1985[66], an increasing mechanization in dyeing, printing and finishing, and the general tendency towards vertical integration of production processes in textiles would indicate that potential growth of employment opportunities for women in these activities of the traditional sector may have been negatively affected by the technological changes.

However, this negative impact is masked by the overall expansion in the textile employment. Although the data series on textile employment are not gender specific the almost two and a half times increase in employment by medium and large firms between 1970-1990 could hardly be attributed to the increase in male labour force alone. The high concentration of the work force in the rather fragmented weaving activity, and the prevailing high reliance on manual spooling in the spinning activity indicate a preference for female labour in these activities. In addition, wages in the textile sector are among the lowest in manufacturing and thus are less attractive to men.

Caution should be exercised, however, in assessing to what extent women, as opposed to men, have been given the opportunity of industrial employment in the modern textile sector, and also to what extent they were willing to take it. Analysis of the female labour force participation between 1964 and 1982 reveals that one of the most important factors explaining a rather low increase in the levels of female economic participation in the period of growth in the 1970s is the low social value accorded to female work in general, and the negative perception of the appropriateness of economic activity for married women in particular.[67] The analysis therefore concludes that as long as household incomes are sufficient to allow women a real choice of

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[63] The average annual rate of growth of textile output was 12.3 per cent and the corresponding figure for value added was 13.6 per cent in the period 1970 to 1990. UNIDO industrial statistical data base.

[64] UNIDO statistical data base.

[65] Indonesia's Industrial Transformation (mimeo). H. Hill, 1989. The survey distinguishes between the growth of value added attributed to the increase in real labour productivity and in employment in large and medium firms contrasted with small firms.

[66] Gherzi Textil Organization: "Indonesia Textile Industry Study", May 1987.

[67] See "Female labour force participation and earnings in Indonesia", Lorrein Corner in Women's Economic Participation in Asia and the Pacific, ESCAP 1987.

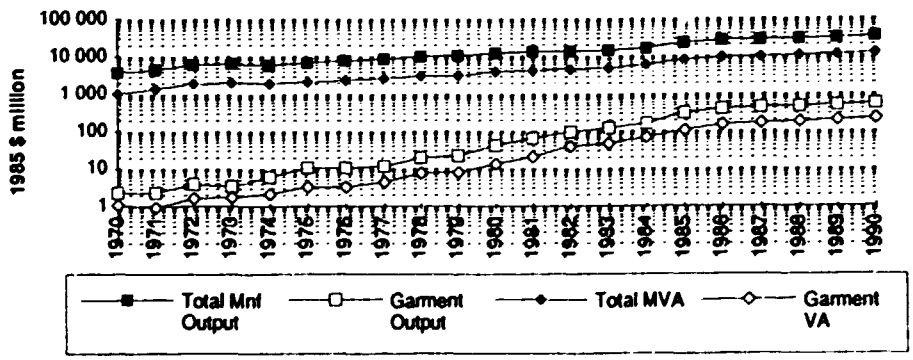
whether to work or not, the social norms, especially for married women, are a significant deterrent to female employment.

5.2 The garment branch

The existence of clothing manufacturing as a small-scale handicraft industry dates back to pre-World War II, but the growth of the modern clothing industry started only twenty years ago. By 1985 the number of registered medium- and large-scale enterprises was over 300 with 66,000 sewing machines. This growth was facilitated by the industrial import substitution strategy in the 1970s and favourable domestic market conditions in that period. However, the most significant boost to the industry has come from the export promotion drive in the 1980s and need to search for alternative markets to compensate for the declining domestic demand.

The MVA share of the clothing industry was negligible till 1983 when it reached 1 per cent, up from 0.2 per cent in 1977, and it is estimated to have reached 1.8 per cent in 1990.[68] The average annual growth rates of both output and value added have been higher than those for the manufacturing sector as a whole in the last twenty years.[69] Figure 14 shows the comparison. Indeed, the clothing industry has been among the fastest growing industries since the mid-seventies, second only to basic metals industries (see Table 7). The domestic value added of the garment branch was higher than that of the textile branch which is due to the larger local input content, mainly in fabric sourcing satisfying 77 per cent of the demand, and accessories.

Fig.14: Growth in Total Manufacturing and Garment Output and Value Added, Indonesia, 1970,...,1990



More important, however, has been the garment industry's contribution to export earnings and employment. Garment exports, valued in current US dollars, increased from about 2.4 million in 1975 to 97.9 million in 1980, 338.6 million in 1985, and have been estimated at 1.1 bill

[68] Measured in constant 1985 US $. UNIDO statistical data base.

[69] Calculated in constant 1985 US $ the average annual growth rates of output and value added of the garment industry were 33.5 per cent and 32.5 per cent respectively compared with 12 and 13 per cent for the output and value added of the manufacturing sector as a whole. UNIDO industrial statistical data base.

Table 7: Manufacturing Growth in Indonesia, 1975-1986[a]

Industry	Large and medium firms			Small firms			All firms		
		% due to			% due to			% due to	
	Growth	V/N	N	Growth	V/N	N	Growth	V/N	N
311 Food products	2.8	-18	118	5.9	123	-23	3.3	58	42
312 Food products	8.3	26	74	-1.5	-257	157	4.8	21	79
313 Beverages	7.7	4	96	9.3	52	48	7.7	17	83
314 Tobacco	13.6	78	22	29.1	-11	111	13.7	52	48
321 Textiles	15.1	74	26	7.3	86	14	14.8	76	24
322 Garments	41.3	33	67	34.2	26	74	38.7	31	69
323 Leather products	22.4	76	24	29.0	30	70	23.7	50	50
324 Footwear	5.1	14	86	29.8	36	64	8.3	-25	125
331 Wood products	27.5	41	59	11.6	33	67	25.4	45	55
332 Furniture	16.2	49	51	19.6	48	52	18.3	47	53
341 Paper products	14.5	26	74	43.6	67	33	15.4	28	72
342 Printing & publishing	13.0	54	46	14.7	46	54	13.3	50	50
351 Basic chemicals	21.0	41	59	22.0	38	62	21.0	40	60
352 Other chemicals	14.9	56	44	20.3	83	17	15.2	59	41
355 Rubber products	0.1	-800	900	-15.1	9	-109	-0.9	25	-125
356 Plastics	18.9	31	69	13.5	21	79	18.5	31	69
361 Pottery & china	27.3	33	67	-9.2	193	-293	25.9	52	48
362 Glass products	26.8	82	18	15.8	22	78	26.7	81	19
363 Cement	14.8	56	44	17.1	53	47	15.1	51	49
364 Structural clay products	18.7	55	45	16.2	56	44	17.2	57	43
369 Other non-metallic minerals	28.4	56	44	18.8	68	32	27.0	61	39
37 Basic metals	64.3	64	36	n.a.	n.a.	n.a.	64.2	64	36
381 Metal products	15.2	54	46	12.2	82	18	14.9	65	35
382 Non-electric machinery	4.1	-17	117	9.7	20	80	4.4	-20	120
383 Electrical equipment	12.5	41	59	8.7	-29	129	12.4	38	62
384 Transport equipment	13.6	33	67	4.1	66	34	13.3	38	62
385 Professional equipment	13.3	5	95	11.2	55	45	12.8	22	78
39 Miscellaneous	19.7	41	59	19.8	29	71	19.7	34	66
All Industries	15.1	59	41	9.4	46	54	14.6	60	40

a/ 'Growth' refers to annual average growth in value added for each industry 1975-86, deflated by the relevant wholesale price index; the growth data are decomposed into the percentage due to the increase in real labour productivity ('V/N') and in employment ('N'). Oil and gas processing is excluded.

Source: Hill, H. Indonesia's Industrial Transformation (mimeo), 1989.

in 1989.[70] This puts the garment industry among the three largest manufacturing export earners after plywood and rubber, accounting for 10 per cent of total manufacturing exports. Available statistical data on employment include only establishments of 20 or more employees. Therefore the real contribution of this sector to total manufacturing employment is underestimated. However, even from those data the increase in the contribution is apparent, from 0.5 per cent in 1975 to 4 per cent in 1990.[71] The average annual rate of employment growth in garments was 26 per cent in the period 1970-1990, which is more than three times that of the employment growth for the manufacturing sector as a whole.[72]

It is the increase in the labour force which has primarily contributed to the overall growth of the garment sector, rather than an increase in productivity. This is also borne out by the results of the survey on manufacturing growth presented in Table 7. As opposed to the case of textiles, 67 per cent of the large and medium firms' growth and 74 per cent of the small firms' growth between 1975-86 have been attributed to the increases in employment. In the case of textiles the respective figures were 26 per cent for large and medium firms, and 14 per cent for the small firms. Thus, whereas in the textile sector the small-scale production units tended to economize on labour more than large and medium firms, in the garment sector the reverse situation, i.e. expanding employment, has been found more pronounced in the small-scale enterprises. This is also revealed by the large number of registered small-scale establishments compared to large- and medium-sized firms. The latest sectoral census in 1988 indicated that the total number of registered firms was 6,431, out of which 472 companies (7.3 per cent) classified as large- and medium-, and 5,959 (92.7 per cent) as small-scale.[73]

The difference in the composition of factors affecting the growth of the two branches is also reflected in the higher value added per worker in textiles rather than in garments.[74] The state of technology is an important determinant of the low contribution of productivity growth to the overall growth of garment production. The level of technology is related to the financial and human capital potential which is to a large extent determined by the size and product specialization of an enterprise. Whereas in the textile sector, especially in the man-made fibre sector, foreign investment has been used as a package deal to transfer technology and technical expertise, this has not been the case in the garment sector.[75]

The garment industry is characterized by the predominance of small-scale production units, low involvement of foreign capital and highly standardized, basic styled export products. A large portion of the domestic capital was brought in as corporate investment from the textile branch. The lack of direct involvement and production expertise on the part of the local

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[70] UNIDO industrial statistical data base.

[71] UIDO data base.

[72] UNIDO data base.

[73] The classification is based on The Ministry of Industry's definitions using the number and type of sewing machines together with degree of specialization as criteria rather than the number of employees. Thus figures from 1985 given in the Gherzi Textil Organization Report of 1987 indicating 2,965 small and 334 large and medium establishments are not compatible since they have used employment as a criteria.

[74] UNIDO statistical data base.

[75] In spite of the most recent increase in foreign investment, particularly from the Republic of Korea, the overall foreign ownership ratio is still below 10 per cent. A survey in 1987 indicated than 8 per cent of 50 large and medium companies were established under the Foreign Investment Law. Gherzi Textil Organisation, 1987.

investors has been to some extent compensated by hiring foreign managerial and technical personnel mainly from Hong Kong and Taiwan Province of China, but also from Malaysia and Singapore. There are training courses for the garments industry as well as college-level design programmes, but the former mainly provide basic skills (the higher-level courses are too difficult for women with no more than primary education) and the latter do not seem attuned to the needs of the industry. Given the shortcomings of local training institutions the responsibility for training largely falls upon the industry. The perceived necessity of providing training has been counteracted by the level of technology presently used and the planning horizon of the producers.

A UNIDO survey of large- and medium-scale enterprises reveals that with few exceptions the level of technology used in pre-assembly and assembly production stages has remained relatively low. Sewing machines currently in use are mostly high-speed, single purpose, industrial type of machines. The machine park is less than ten years old with the majority being less than five years old. However, the machines are at the most basic level of available technology placing the sewing and production technology at least twenty years behind that currently used in the advanced countries. Except for speed and variety of stitch types, the advantage of industrial type sewing machines lies mainly in their ability to withstand long operating hours and the possibility to use various kinds of attachments to produce special kind of seams. There has been virtually no investment in handling methods and improvements of the equipment to increase productivity.

The situation in the pre- and post-assembly stage, i. e. cutting and finishing, is similar. For cloth cutting hydraulic die cutters are commonly used but there is a complete absence of computer-based technology for design, pattern making and grading, cutting, and material lay-out and handling. Almost all the surveyed companies still use hand steam irons. Where machine presses are installed or planned, the equipment is very basic and out of date. The same applies to washing operations which may be contracted out if special treatment, like stone-washing, is required. Although some companies are introducing computer systems for production planning and control, these cases are rare exceptions to the common management style based on traditional book keeping.

Thus, with very few exceptions, no labour-saving machinery has been introduced so far. This is reflected in a high ratio of direct to indirect labour, low productivity and equipment efficiency compared to companies producing similar products in the U.S.A. and Europe.[76] The low cost and abundant supply of labour together with the highly labour intensive character of garment production has enabled the Indonesian garment industry to remain competitive in spite of its technological deficiencies and the lack of proper training in most factories.

The present relatively favourable position of the Indonesian garment exports provides no immediate incentives for investment in new technology. The lack of formal technical training of mechanics and fear of possible shortages of spare parts are additional factors explaining the reluctance to invest in more sophisticated, contemporary equipment. In view of the generally short planning horizon of the enterprises, it is not surprising that company-level interviews revealed that most manufacturers do not foresee the need for any fundamental changes in the near future, except for the introduction of special attachments to the existing sewing machines for thread cutting and piping. Only a few companies indicated interest in computer-aided equipment.

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[76] The productivity measured in time it takes to produce a specific garment was estimated at 47.6 per cent of a European or American company average. The equipment efficiency measured in work value achieved per minute on available equipment was 68 per cent compared to 'not the latest state of the art' technology available in the advanced countries in 1986. Gherzi Textil Organization "Indonesia Textile Industry Study", May 1987.

The skill intensive part of the production chain as well as the potential high value added lies in product design and marketing. Both these operations are mainly performed outside Indonesia, since design and specifications are determined by the overseas importers who also handle the export transactions directly or through their regional offices in Hong Kong, Taipei or Singapore. Although small-scale producers supply primarily the domestic market, there are signs of some developing their own export products based on traditional designs geared to specific high-fashion market niches. This awareness of the need to develop local capabilities to respond to the requirements of high-fashion export markets is also found among a very limited number of larger firms.

According to employment reports submitted by registered clothing companies, the number of workers in medium and large companies stood at approximately 82,000 in 1987.[77] The total number of workers, including small-scale producers yet excluding home workers engaged in the farming-out system, was estimated at 207,000.[78] As in the case of the textile sector, time series data on employment in the garment sector suffer from the same problem of different definitions and lack of gender differentiation. The estimated proportion of the female labour force is thus based on the results of a UNIDO survey carried out for 40 large-, medium-, and small-scale enterprises.[79]

The survey estimated that the average share of female workers in the sample was about 77 per cent. Using the same percentage for the total garment branch employment indicates that about 159,000 women found employment in that branch in 1987. The majority of these women were working in small-scale enterprises, about 106,000, which still does not count the home-based workers in the informal sector. Using the ILO data on the economically active female population engaged in manufacturing activities indicates that 6 per cent of all women in manufacturing were employed in the garment branch in 1987.

The occupational structure of women in the garment sector examined in the UNIDO survey showed a surprisingly high share of women, 78.5 per cent, in the employees category compared to a 76.9 per cent share in the workers category.[80] This indicates an overproportionally high representation of women among managers, designers and pattern makers, as well as supervisors. However, the share of this occupational group represented only 0.4 per cent of the total employment in the sample. The strong position of women in design and pattern making can be explained by the traditional involvement of women in these activities which have been accepted and remained the forte of women. In Indonesia, there is only a handful of male clothing designers involved in the production of exclusive high fashion clothing.

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[77] UNIDO data base of industrial statistics puts the number at about 69,000. The discrepancy is largely due to different definitions regarding medium- and large-scale enterprises. UNIDO data are used for the time series analysis.

[78] This figure is also used in the Ghersi Textil Organization report of 1987.

[79] The survey was a part of the country case study issued as UNIDO Working Paper: "Technological and Organizational Change in the Clothing Industry. Implications for Indonesia's Competitiveness with Special Emphasis on Human Resource Requirements and the Role of Women", 1992.

[80] Occupational representation in the sample was : managers 9.85%, experts 0.43%, supervisors 2.32%, machine operators 56.48%, manual workers 16.82%, and supporting occupations 14.1%. The first three groups were classified as employees and the remaining three categories as workers.

The rather surprisingly high share of women in the managerial posts both as directors among the top decision makers in large- scale enterprises[81], and owners and/or managers of small-scale companies could be explained by the social acceptability and career prospects open to women. As discussed in the textile sector section, the low value attributed to female labour and factory employment being considered as inappropriate specially for married women act as a deterrent to women's participation in the industrial labour force. Since garment making is accepted as a part of women's traditional activity, career development and promotion prospects for female non-production employees are far better in the garment sector than in most other branches of manufacturing, as many of the key positions cannot easily be replaced by men in a tradition-bound environment.

The relatively low share of women in the worker category is to some extent distorted by the inclusion, apart from machine operators, of manual workers and supporting staff such as drivers and guards. The representation of machine operators in the total labour force in the sample comprised only 56.5 per cent compared to 30.9 per cent for the manual and supporting labour groups taken together. The turn-over rate for female workers in the large- and medium-scale enterprises is very high with 2-5 years as an average duration of employment. The average age of female workers is 20 years which indicates that mostly unmarried women are employed.

It is not the practice of the large- and medium-sized firms to retain retired women for the farming-out work. This is due to the division of labour in the production processes and the cost of providing an industrial type of machine related to the specialized type of work and skills of the retiring women. Operation of a high speed sewing machine requires special skill which is acquired through on-the-job training. Since there is a shortage of trained machine operators due to the high turn-over, this guarantees an easy re-entry into these jobs for those former employees wishing to come back.

The situation in the small-scale enterprises is different due to the low degree of division of labour and skill specialization. The activities of small-scale enterprises are still predominantly tailor type of operations using simple household type of sewing machines. It is a common practice of small-scale entrepreneurs to retain their former female workers for farming-out work and equipping them with simple sewing machines for home-based production paid on piece rate basis. Apprenticeship is the most common form of training provided formally by enterprises or informally by passing on family skills.

As long as the presently favourable conditions for small-scale operations are not eroded by changes in technology and/or the organization of production,it would seem more advantageous for low-skilled women to enter the small-scale sector where they have higher probability for continuous income earning opportunities and also receive a more varied skill training which is more easily transferable compared to the situation in medium- and large-scale enterprises. However, it should also be mentioned that exposure to an industrial worker culture in the larger and more modern type of industrial establishments is an important asset for the future development of female industrial labour; and the large modern enterprises certainly offer scope for women who have acquired the higher-level technical, design or organizational skills.

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[81] Three of the country's largest jeans manufacturers are managed by women.

5.3 Conclusions

The preceding examination has confirmed the hypothesis that Indonesia's textile and garment industry is at the second stage of industrial development. It has followed the path from import substitution to export promotion, building up and diversifying its industrial base and slowly opening up to external competition. The advantages of locally available raw materials and cheap and abundant labour supply have helped to build up international competitiveness. The economic importance of the textile and garment subsector has been demonstrated in terms of value added, export earnings and employment creation. The latter has been facilitated by the maintenance of low wages which also contributed to slowing down the process of capital/labour substitution.

With respect to the impact of technology changes on women in the textile branch the conclusions are rather ambivalent due to the lack of information and data. However, it appears that in general there has been an increase in the absolute number of female workers over the last twenty years. However, this may mask the changes in their proportionate participation due to whatever limited and sub-sector specific technological changes have taken place. This is difficult to prove in the absence of data on female shares in the textile labour force. The effect of low social acceptability and negative perception of industrial women workers may have played a more important role than technology changes in deterring women from potentially more significant participation.[82] This factor would be important to consider when many of the heavy manual tasks requiring male labour in the present textile production are automated potentially providing new employment possibilities for women. The traditional attitudes are already being challenged in cases where the economic family situation has deteriorated, leaving a little scope for women to make choices about employment.

The conclusions concerning women's participation in the garment sector are less controversial due to the availability of information about the recent situation of women in this sector. The establishment of modern garment production is relatively recent and there have not been any major changes in technology since the installation of the machinery 10-15 years ago. Women have found an easy entry into all sizes of establishments mainly thanks to the social acceptability of garment making as a traditional women's activity. This has also affected women's relatively high penetration into managerial positions. The structure of the sector with the overwhelmingly large proportion of small-scale enterprises using an extensive system of sub-contracting to home-based production created more convenient and also socially more acceptable working conditions for a large number of women.

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[82] Analysis of female labour participation between 1964 and 1982 revealed that the general economic development and rising education has not been reflected in any clear and consistent pattern of the female labour force participation in Indonesia. Most Indonesian studies fail to show the expected positive effect of higher levels of income and education on female labour force participation. The exception is for women with senior and tertiary level of education who, however, constitute only a small percentage. Low social value put on female economic activity was found to be an important factor affecting the low level of employment opportunities for women and low wages which have not kept pace with the growth of female labour force and aspirations raised by the increasing level of female education. For detailed discussion see Lorraine Corner: "Female labour force participation and earnings in Indonesia" in Women's Economic Participation in Asia and the Pacific, ESCAP, Bangkok 1987.

CHAPTER 6
THE EXPERIENCE OF JAPAN AND NEWLY INDUSTRIALIZING ECONOMIES OF ASIA

The economies chosen as examples of the more advanced stages of industrial development, referred to as stage three and four in the conceptual framework, are the Territory of Hong Kong (referred to as Hong Kong), the Republic of Korea, Singapore, Taiwan Province of China, and Japan. The experience of the first four countries, also known as the Newly Industrializing Economies (NIEs) of Asia, provides a useful point of reference as to the implications of the transformation to the third development stage of the textile and garment industry. Japan, an industrially advanced economy, is also an important regional catalyst and was, to a large extent, the forerunner of the modern textile and garment industry in Asia.

The transformation of the Japanese textile and garment industry has had direct implications for the development of the textile and garment manufacturing in the NIEs. The NIEs, through their respective restructuring, affected the growth of the textile and garment industry of other Asian economies further up the development path, including Thailand, Indonesia and Bangladesh. Due to the fact that many processes in the textile and especially clothing production still are labour intensive, it is easy to see how the comparative advantage in cheap labour has moved from Japan to the NIEs and later to countries like Thailand, Indonesia and even later to Bangladesh. However, parts of the production which have become capital, technology and skill intensive, such as the production of synthetic fibres, design and pattern making, are the last to be relocated.

This section summarizes the experience of the textile and garment industry in Japan and the NIEs with emphasis on changing patterns of industrial structure, employment and skill requirements. The position of women in this process is examined in more general terms to see the longer-term implications of labour market restructuring. Where gender specific data are available, the changing position of women in the textile and garment sector is examined in particular.

6.1 Structural changes

6.1.1 Economic and industrial restructuring

Recent years have seen technological quantum leaps in a variety of fields: micro-electronics, informatics, man-made materials, biotechnology, and space and nuclear technology. Japan plays a leading role in technological progress in many of these fields, and the Asian NIEs are rapidly adopting some of the advanced technologies, especially in electronics. These new technologies are bringing about basic changes in industrial production as well as in the organization of production. Micro-electronics as well as informatics are also basic elements in the increasing role played by production-related services within manufacturing, and, finally, are causing an intersectoral shift in value added and employment, away from manufacturing, into services [83]

[83] Growth of the tertiary sector has surpassed 55 per cent as a contribution to GDP in most OECD-countries already in 1980. At present the contribution of service sector, both to GDP and employment, has surpassed the 60 per cent mark in most of these countries. OECD Observer.

Japan already started the transition to a service economy in the 1970s, whereas the NIEs (the Republic of Korea excepted) followed with different speed in the 1980s.[84] In Japan, Taiwan Province of China, Singapore and Hong Kong, the share of manufacturing in GDP declined. The Republic of Korea was the only economy showing a modest increase of the share of manufacturing, from 29.7 per cent of GDP in 1980 to 31.3 per cent of GDP in 1989.[85]

Within manufacturing, there are clear tendencies towards structural change in all the economies under review. The electronics industry leads industrial restructuring.[86] Other technologically advanced industries, such as non-electrical machinery, transport equipment and, in some cases, publishing and printing (an industry where the modern information processing technology is now used on a massive scale) follow. Chemicals and metals, leading branches in the previous "industrial revolution", still play a key role in some cases. The position of typical low-wage industries of an early industrialization stage such as textiles and garments has become seriously eroded in almost all the economies, and they are being relocated. In Hong Kong the subsector is still strong, but growth has slowed down. What is more, industry no longer plays a dominant role in Hong Kong's economy. It is the most strongly service-oriented economy of all.

6.1.2 Restructuring of the textile and garment sector

The declining proportion of the textile and garment branches in total manufacturing value added for the five economies is illustrated in Figures 15 and 16 (following page). The decline is more pronounced in the contribution of textiles than that of garments. The following is a short summary of the individual experiences.

In **Japan**, the contribution of textiles and clothing to the economy had reached its peak around 1930 when textiles and clothing provided one-tenth of GDP and employment and one-third of the country's total export earnings.[87] The importance of these industries to the manufacturing sector had peaked a decade or so earlier, when they accounted for 30 per cent of manufacturing value added and approximately 60 per cent of both industrial employment and exports of manufactures.[88] Today the textile and clothing sector accounts for less then 2 per

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[84] The share of the service sector in GDP has grown fastest in Hong Kong where it reached 73 per cent by 1988 compared with 63 per cent in Singapore and 57 per cent in Japan in 1989. ESCAP "Industrial Restructuring in Asia and the Pacific", p. 39, Bangkok 1991.

[85] UNIDO "Industry and Development, Global Report 1991/92", Statistical Annex.

[86] In **Japan**, the largest branch is now electrical machinery, with 15.3 per cent of MVA in 1989, up from 11.5 per cent in 1980. Electrical machinery is also the most important branch in the manufacturing sector of the **Republic of Korea**. It grew spectacularly during the 1980s, its share increasing from 8.1 per cent in 1980 to 15.5 per cent in 1989. In **Hong Kong**, garments and textiles still dominate with a total of 37 per cent, but the most rapidly growing industries during the past decade were electrical machinery, non-electrical machinery and printing and publishing. Together, these industries now account for 25.3 per cent of MVA, as opposed to 19.9 per cent in 1980. In **Singapore**, electrical machinery is again the leading branch, with an MVA share that grew from 23.3 per cent in 1980 to 39.4 per cent in 1989. Structural change in **Taiwan Province of China** is not as strongly characterized by the rise of the electronics industries as in the other NIEs and Japan. The share of electrical machinery in MVA increased from 11.2 per cent in 1980 to 12.3 per cent in 1989. This was still enough to make it the largest industrial branch. Chemicals, metal products and non-electrical machinery, however, were growing faster. ibid. 1991.

[87] Young-Il Park and Kym Anderson: "The Rise and Demise of Textiles and Clothing in Economic Development: The Case of Japan", Economic Development and Cultural Change, Vol.39, No.3, April 1991.

[88] ibid.

Fig.15: **Share of Textiles in Total Manufacturing Value Added, Asian NICs and Japan, 1970,...,1990**

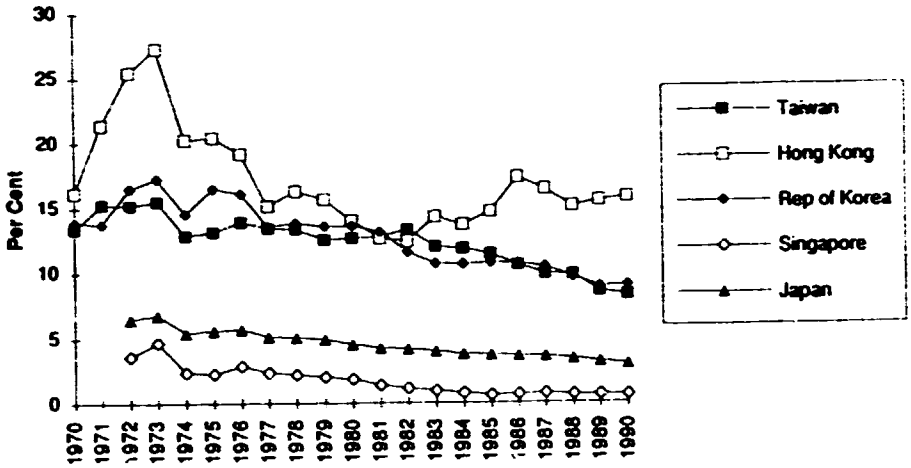
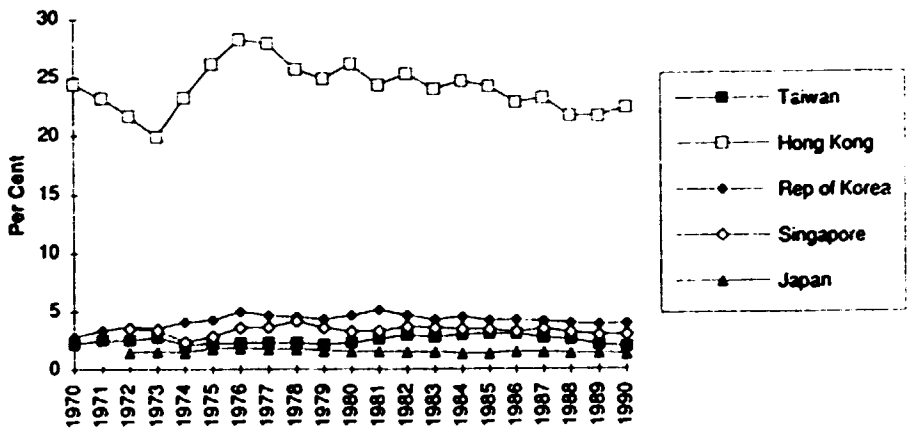


Fig.16: **Share of Garments in Total Manufacturing Value Added, Asian NICs and Japan, 1970,...,1990**



cent of GDP and employment and contributes less than 5 per cent of manufacturing exports.[89] Japan's comparative advantage in textiles and garments (measured in terms of their share in Japan's exports compared with their importance in the total world trade) has been declining since the 1950s.[90]

The experience of the Asian NIEs has been similar but compressed to a much shorter period of time and after a much later take off: the 1950s in Hong Kong, and the 1960s in Singapore, the Republic of Korea and Taiwan Province of China. The NIEs became the largest textile/clothing exporters during the 1960s and the 1970s, on average contributing more than 75 per cent of the total Third World exports over that period.[91] However, the international importance of the NIEs' textile/clothing exports has been declining since the 1980s when a new group of Asian countries has taken over the labour intensive parts of the textile and garment production. The domestic share of the textile/clothing exports has been declining since the early 1970s (see Figures 17 and 18).

Fig.17: Share of Textiles in Total Manufactures Exports, Asian NICs, 1970,...,1990

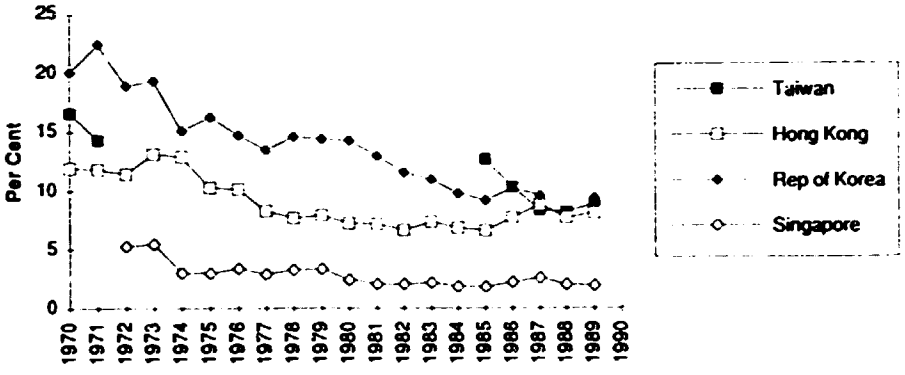
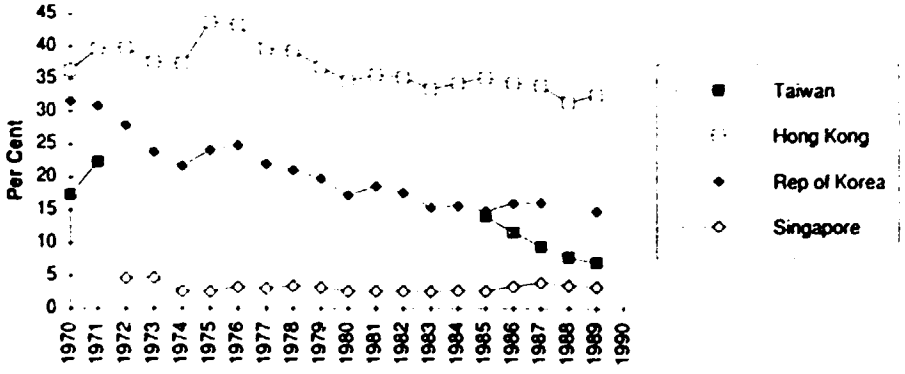


Fig.18: Share of Garments in Total Manufactures Exports, Asian NICs, 1970,...,1990



[89] ibid.

[90] ibid.

[91] Kurt Hoffman, "Technological and Organization Change in the Global Textile-Clothing Industry. Implications for Industrial Policy in Developing Countries" in UNIDO, PPD.141 1989

In **Hong Kong**, garments still dominate the manufacturing sector, with a 21.7 per cent share in MVA in 1989. It is followed by textiles, with a 15.5 per cent share. But both textiles and garments are evidently losing their once dominant position which was at the peak for textiles in the early and for garments in the middle of the 1970s (see Figures 15-18). The visible loss of the importance of textiles is reflected by the relocation of spinning and weaving production to more competitive producers and the concentration on middle and high priced garment exports which are increasingly relying on the use of computer technology.[92] Results of this restructuring are also born out by the trade data. The trade deficit in textiles has increased more than five times between 1970 and 1990, while the positive trade balance in garments has been steadily rising.[93]

In the **Republic of Korea**, garment manufacturing has played a minor role in manufacturing production and has never contributed more than about 5 per cent to MVA (see Figure 16). A strong base in the textile sector, although diminishing in its economic importance (see Figure 15), has been retained and developed in the field of synthetic fibres and high quality products using most modern technologies. Although less important in terms of value added, the garment industry has been a more important contributor to export earnings than the textile industry. However, the share of both textiles and garments in total manufacturing exports has been declining since the beginning of the 1970s (see Figures 17 and 18).

Singapore, similarly to Hong Kong, has shed the textile production and specialized in garments (see Figure 15). The MVA share in wearing apparel, although never as high as the peak of the textile contribution, has declined slightly during the 1970s and 1980s (see Figure 16). This trend is also consistent with that of the two sectors' contribution to manufacturing export earnings which fell more in the case of textiles than garments (see Figures 17 and 18).

Taiwan Province of China, like the Republic of Korea, has a strong base in textiles in spite of the declining importance of that branch in total MVA (see Figure 15). The position of wearing apparel, although less significant than that of textiles, was relatively stable during 1970s and 1980s (see Figure 16). The trade time series data are incomplete for most part of the 1970s and the early 1980s. However, comparing data for the years available, the downward trend in the share of manufacturing exports is quite clear for both textiles and garments (see Figures 17 and 18).

6.2 Changing employment pattern: quantitative aspects

The structural changes of the five economies have had clear implications for the pattern of employment. The inter-sectoral mobility is evident in the declining share of manufacturing employment in favour of the service sector. The intra-sectoral mobility, i.e. within manufacturing, reflects the declining importance of the light industries as the major employment generating manufacturing branches. Impact of these changes on the pattern of female employment in general and within the textile and garment industry in particular is discussed below.

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[92] In 1987 there were at least 46 Gerber CAD/CAM systems in Hong Kong. Textile Asia, May 1988.

[93] The textile trade deficit increased from US$ 238 million in 1970 to US$ 1,555 million in 1989, and the trade surplus in garments increased from US$ 645 to US$ 8,206 million in the same period. UNIDO industrial statistics data base, current US$.

6.2.1 Sectoral mobility

Based on ILO statistics (excluding Taiwan Province of China)[94] Figure 19 shows the changing position of the manufacturing sector in terms of the total and female employment during the last two decades. A declining importance of the manufacturing sector as a source of employment is most pronounced in Hong Kong and to a lesser degree in Japan. In Singapore the downward trend observed in the early 1980s was reversed between 1987 and 1889. The Republic of Korea is the only case among the four economies showing a continuous increase in the contribution of the manufacturing sector to employment up to 1988.

Changes in the female employment follow the same pattern. The share of women in total employment has increased in all four economies with the highest increase recorded in Singapore. The highest decrease in the participation of women in the manufacturing sector, in terms of their share in the manufacturing labour force and also their share in the total female employment, occurred in Hong Kong. Nonetheless, Hong Kong still has the highest female participation in the manufacturing sector followed by Singapore. Singapore has the largest share of female employment in the service sector although the rate of increase has not been as large as that in Hong Kong (see Figure 20). The rising importance of the service sector is evident in all four economies, with finance and banking services showing the most spectacular increase among the service categories. This also applies to the Republic of Korea which is the only economy where the share of manufacturing sector in the total female employment was steadily rising till 1988. Japan has the lowest female participation in the manufacturing sector among the four economies but has the highest share of women in the service sector after Singapore.

6.2.2 Employment in textiles and garments

The industrial statistics on manufacturing employment by branch[95] show a marked decline in the share of textiles employment in the total manufacturing employment for all four NIEs in the last two decades (see Figure 21). In Japan, the importance of the textile industry started declining already in the 1930s and thus the change in employment was not so great in the last twenty years. The downward trend in employment, both in absolute and relative terms, is indicative of the technological changes which have taken place in the textile industry.[96] These changes are reflected in the productivity increases presented in Figure 22. The high level of productivity associated with a high degree of automation is a result of general labour shortages, and low cost labour in particular, experienced by the economies under review, especially Japan, Hong Kong and Singapore. Textile industries in all five economies have made use of the available technology which not only allows an easy substitution of labour for capital and thus compensates for the labour shortcomings, but also leads to improved quality, design

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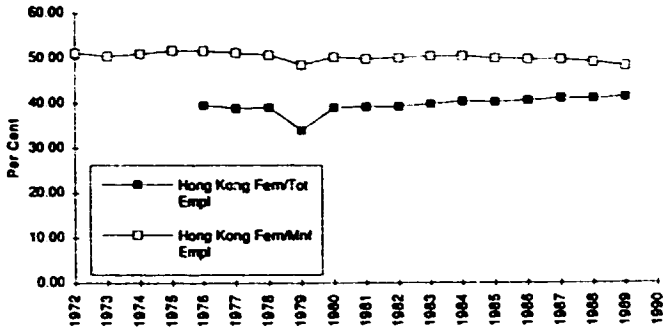
[94] ILO statistics on the five economies are based on employment sample surveys in table 3B except for Hong Kong where establishment survey data are used. The compatibility of data is also affected by the inclusion of different population age groups.

[95] UNIDO data base was used in preference to ILO statistics. Although UNIDO's data are primarily based on the same sources as the ILO data in table 5B (establishment surveys), they include estimates to compensate for the missing information.

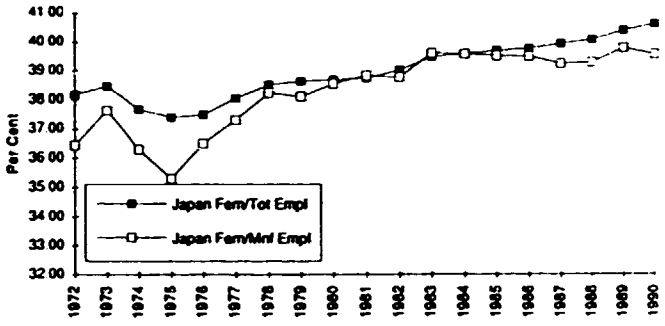
[96] The largest decrease in the textile labour force occurred in Singapore where the size in 1990 was only about the forth of that in 1990. In Japan the size of the textile labour force decreased by one third in the same period. In Taiwan Province of China the decline started only at the beginning of the 1980s. The level of employment in Hong Kong has been fluctuating but going down since 1988. Republic of Korea shows a continuous increase till 1987 but declines in the following three years. UNIDO data base.

Fig.19: Share of Females in Total and Manufacturing Employment 1970,...,1990

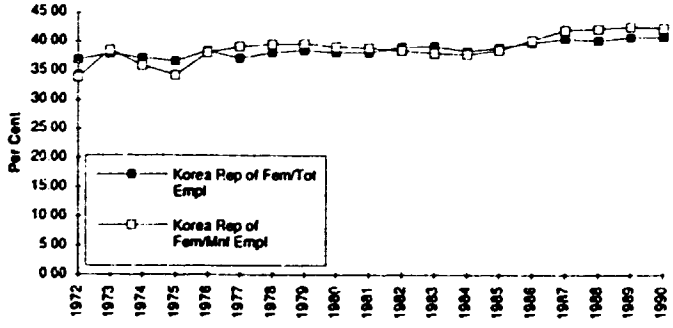
a: Hong Kong



b: Japan



c: Rep. of Korea



d: Singapore

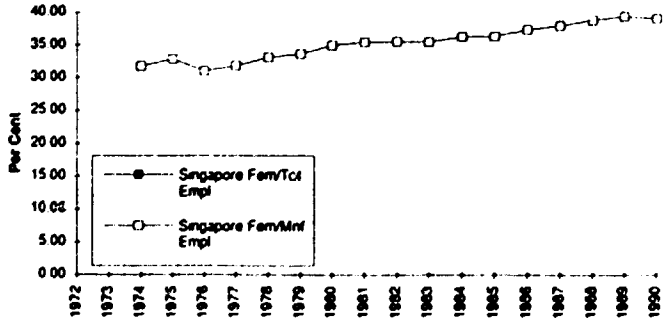
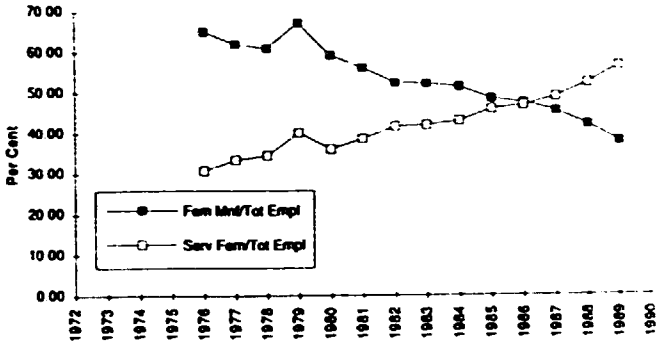
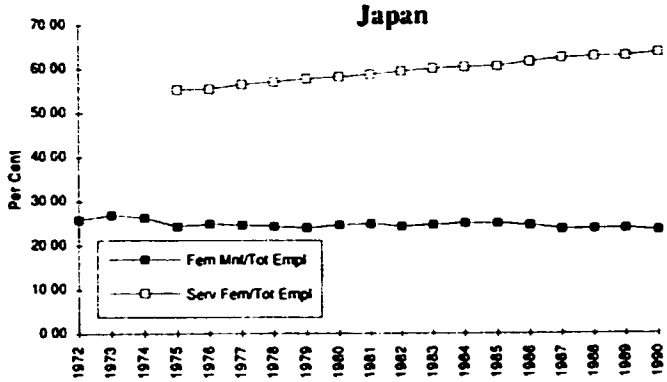


Fig.20: **Share of Manufacturing and Services in Total Female Employment, 1970,...,1990**

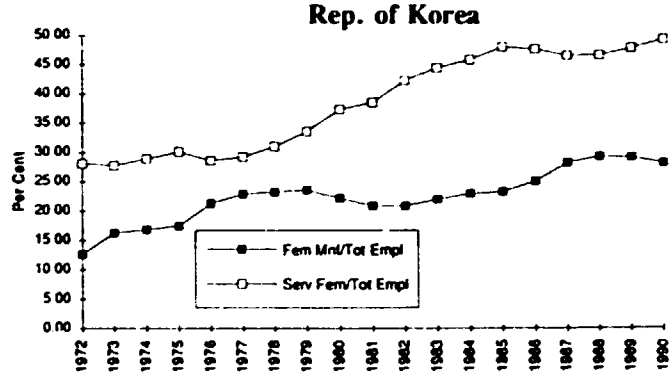
a: **Hong Kong**



b: **Japan**



c: **Rep. of Korea**



d: **Singapore**

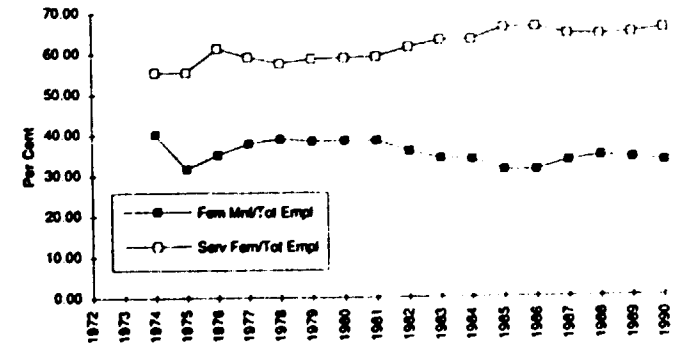


Fig.21: **Share of Textile Employment in Total Manufacturing Employment, Asian NIEs and Japan, 1970,...,1990**

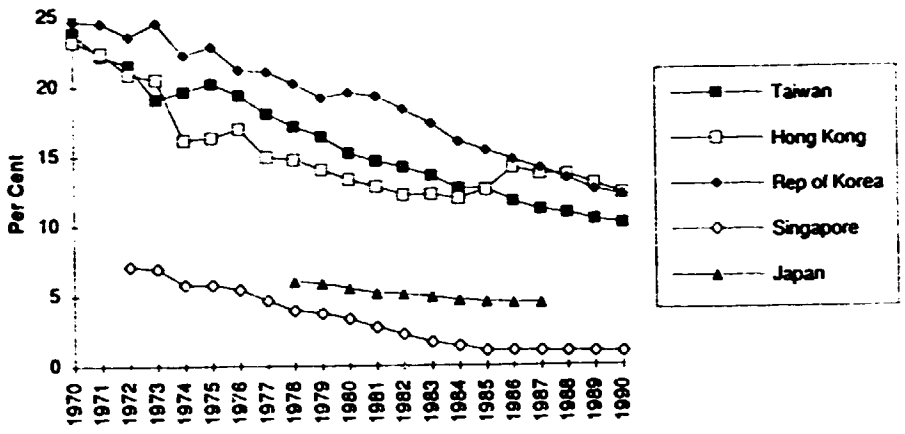
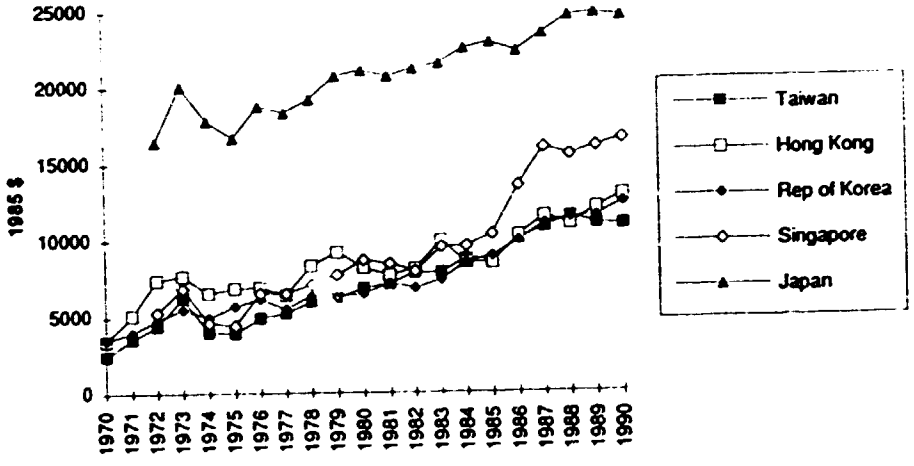


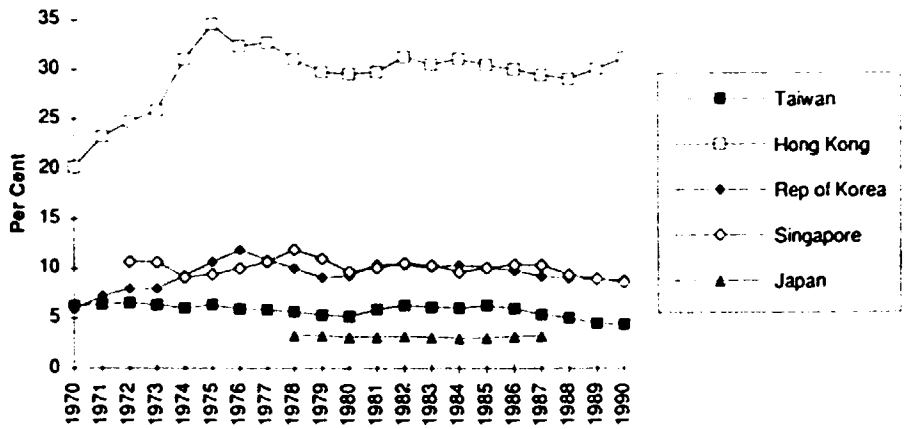
Fig.22: **Value Added per Textile Employee, Asian NIEs and Japan 1970,...,1990**



and service. The latter change was also necessary to combat the increasing pressures from low wage and low value added textile producers in other Asian countries.

The situation in the garment industry is different (see Figures 23 and 24). In contrast to the textile industry the importance of the garment industry as a source of manufacturing employment shows rather an increase than a decline for all the economies, at least until the last quarter of the 1990s. Also in absolute terms, the size of the garment labour force has been steadily rising up to the end of the 1990s.[97] Although the rate of productivity growth in garments is compatible with that in the textile industry the absolute level is lower. This could be expected given that technology changes in the garment industry have not as yet significantly altered the industry's labour intensive character. However, automation in the pre-assembly stage is common in Japan and also increasingly so in the NIEs, especially in Hong Kong and Singapore.[98] In addition, development of supportive services based on an extensive use of computer technology aiding production and marketing has enabled Hong Kong and Singapore to become not only fashion centres in their own right but also to attract the establishment of regional offices of international firms dealing in garments.

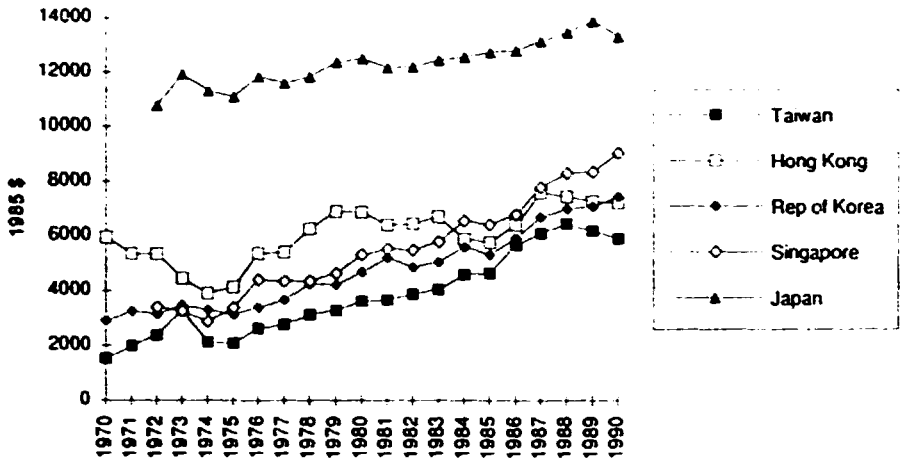
Fig.23: Share of Garment Employment in Total Manufacturing Employment, Asian NIEs and Japan, 1970,...,1990



[97] The largest increases occurred in the Republic of Korea and Hong Kong where the garment labour force increased by almost five and three times respectively between 1970 and 1970. Only in Province of Taiwan the employment in garments has been declining since 1986. UNIDO data base.

[98] Hong Kong is in the forefront of all developing countries in the adoption of computer technology in the garment industry. Already in 1987 there were at least 46 Gerber CAD/CAM systems in use in Hong Kong. Textile Asia, May 1988,p.156.

Fig.24: Value Added per Garment Employee, Asian NIEs and Japan, 1970,...,1990



Unfortunately, the industrial statistics are not gender specific. Thus ILO data on female employment by manufacturing branch, available for **Hong Kong, the Republic of Korea and Singapore**, are used to provide some indication of the position of women in the textile and garment industries.[99] In Hong Kong and Singapore the garment industry has provided much larger opportunities for female manufacturing employment than the textile industry whereas the opposite is the case in Korea (see Figure 25). In Hong Kong, female employment in the garment industry as a share of total female manufacturing employment has been rising from 34 per cent in 1972 to 43 per cent in 1989. The corresponding share for Singapore is much smaller, 14 per cent in 1989, a decline from 18 per cent in 1983. The Republic of Korea shows a similar declining tendency in the latter part of the 1990s.

What appears to be a common feature for Hong Kong, the Republic of Korea and Singapore is not only the declining importance of the textile industry as a source of female manufacturing employment but also the declining share of female labour force in the total textile employment (see Figure 26). In view of the technology changes in the textile industry this could be interpreted as having a negative impact on female employment. Thus this evidence would seemingly support the hypothesis that increasing automation and high technology favours male employment and marginalizes women. However, this conclusion needs to be verified by the fact that women have been leaving the textile and garment sector on their own accord in search of better employment in other manufacturing branches, such as electronics, and the service sector. Unfortunately, there is no quantitative evidence pointing towards the proportion of these "voluntary leaver" responsible for the declining share of females in the textile sector employment.

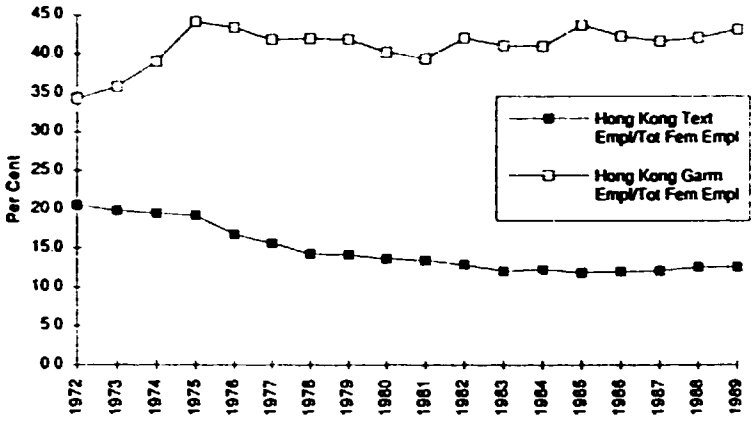
6.3. Occupational mobility of the female labour force

Occupational mobility related to changes in skill requirements is an additional aspect of changes in the labour market accompanying economic and industrial restructuring. For the five economies reviewed, no detailed gender specific statistical breakdown by occupational status in the textile/garment subsector was available, let alone a data series showing possible changes over

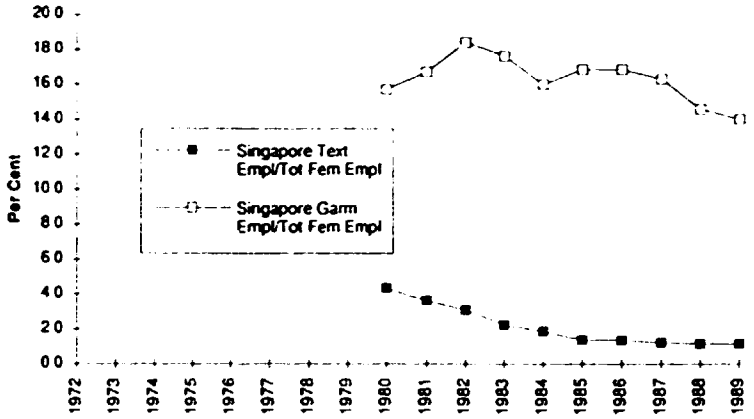
[99] ILO data on manufacturing employment by branch and gender (table 5B) are based on establishment survey data including establishments with 10 and more employees in Singapore and Hong Kong, but with 5 and more employees in Korea.

Fig.25: **Share of Textiles and Garments in Total Female Manufacturing Employment, 1972,...,1989**

a: **Hong Kong**



b: **Singapore**



c: **Rep. of Korea**

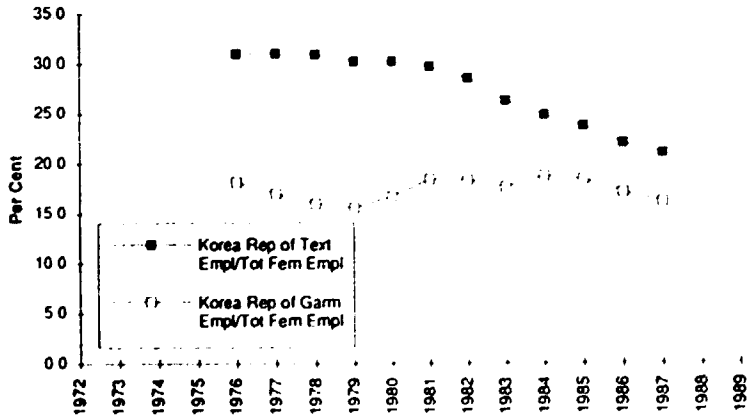
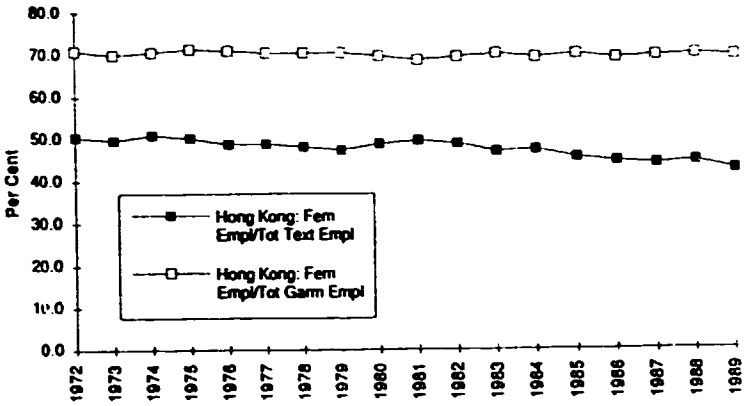
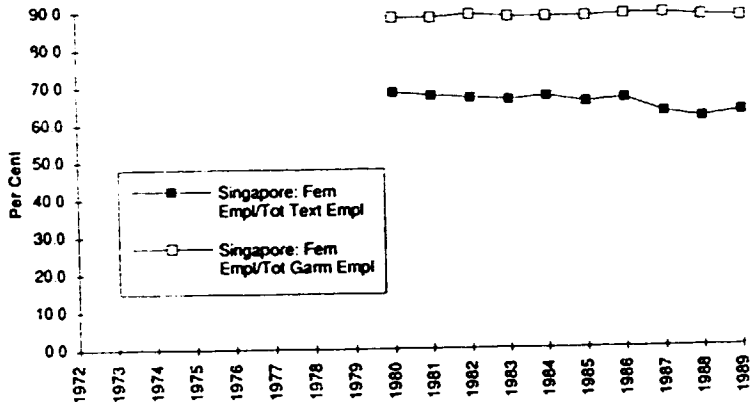


Fig.26: Share of Women in Total Textile and Garment Labor Force, 1972,...,1989

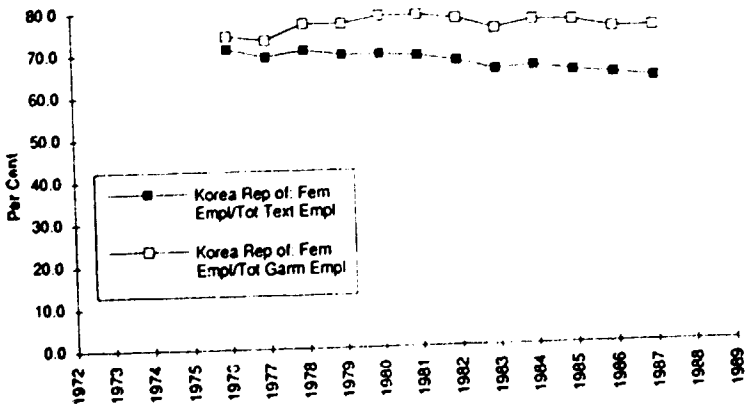
a: Hong Kong



b: Singapore



c: Rep. of Korea



time. Thus to supplement such a fragmentary evidence, the review makes use of the available statistics on shifts among occupational groups in overall female employment and other information pertaining to the quality of the female labour force which would also be relevant for the textile/garment subsector.

The manual workers category (production and transport workers, equipment operators and labourers) together with the clerical workers category are the most important categories of female employment in all the economies. But, except in the Republic of Korea, the manual workers category is growing more slowly than female employment in general. On the other hand, the clerical workers category is growing faster than female employment in general.[100] There is evidence, however, that in the majority of cases and in contrast to male workers, female clerical workers have temporary employment (this is usually also the case in manufacturing), which is an obstacle to seniority and hence effectively blocks career prospects.[101]

In spite of the obstacles that women face and in spite of the fact that the numbers are still very modest in most cases, the highest employment growth rates are found in the two categories
which demand a higher educational attainment, i.e. professional and technical workers, and administrative and managerial workers (see Table 8).

Table 8: Growth of Overall Female Employment and Selected Employment Categories, Hong Kong, Japan, Republic of Korea and Singapore, 1980-1989 (1980=100)

	Overall fem. empl. growth	Professional & technical worker	Administrative & managerial worker
Hong Kong	108	152	234
Japan	114	137	173
Rep. of Korea	136	277	275*
Singapore	135	165	329

** 1981=100*
Source: ILO - Year Book of International Labour Statistics 1989-1990, p.435,437, 440

Growth is particularly strong within the administrative and managerial workers category, with growth rates more than double the average in the case of the NIEs. Growth, although on the whole quite strong, is less marked in the professional and technical workers categories, where the crucial skills for technological progress are found. The exception is the Republic of Korea, where the growth figure is twice the overall average for female employment. In all economies, the share of females in these categories is still well below that of men.

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[100] In Hong Kong, the manual workers category is declining even in absolute terms, whereas the growth rate of clerical workers category is more than twice that of overall female employment. Marina Thorborg, "Korea Programme on Women", UNIDO mission report, January 1992.

[101] ibid.

The employment situation of women in **Japan** is favoured by the increasing labour shortages and the rapidly rising level of education among women.[102] Thus the range of jobs open to Japanese women in various sectors and their average professional level are also rising. This conforms to a general trend in advancing and advanced economies where the range of skills needed in the economy expands, and the overall level of skills is rising. Japanese women are, in short, less dependent on traditional low-skill jobs, in textiles or elsewhere, even if - as indicated above - they are not making rapid progress at the highest employment levels. It is interesting to note that although the overall level of textile employment has been decreasing, the share of women in both blue- and white-collar workers categories has remained high and relatively stable between 1984-1988, 70 and 67 per cent respectively.[103]

There is an increase in subcontracting and homework, among others in information processing and clerical work, a development made possible by the application of micro-electronics.[104] This type of work is highly insecure, although the qualifications required are often much higher than in the traditional female labour-intensive industries. However, there is a tendency among this group as well as among female part-time workers towards longer-term employment favoured by the situation of rising labour shortages.

In Japan, the figures for women are still particularly low in comparison with those for men in the administrative and managerial workers category. Amongst the obstacles to women's advancement into higher management positions is their educational background which, although high, is in fields less relevant for technology and business.[105] Another important factor is the traditional seniority-based reward structure built into the promotion system and career advancement which discriminates against women.[106] In addition, women workers' own perception of employment as a choice rather than a matter of course which is based on traditional values about female roles and reinforced by the media, acts as a deterrent to women's advancement

The evidence from **Hong Kong** points towards an increasing tendency among better educated and more career conscious school leavers to avoid employment in the manufacturing sector generally.[107] The garment industry particularly has the image of a low-skill, low-tech sector, and this increasingly encourages young women to look for jobs elsewhere. The garment firms facing increasing labour shortages and MFA quota restrictions have adopted a strategy to relocate the assembly stage of garment production to other developing countries, particularly to mainland China, Thailand or even to Panama. A pursuit of a strategy emphasizing training

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[102] The job-opening-to-applicant ratio has been above 1 since May 1988. "Women in Japan's Work World See Slow Change from Labour Shortage , Equal Employment Law", Japan Economic Institute Report No.33 A, August 30, 1991.

[103] ILO General Report, Textiles Committee 12th Session, p. 17, Geneva, 1991.

[104] ILO - Diversification of women's employment and training, Bangkok 1987

[105] In 1990 college graduates comprised 24.1 per cent of the male work force but only 4.8 per cent of the female workers. "Women in Japan's Work World See Slow Change from Labour Shortage , Equal Employment Law", Japan Economic Institute Report No.33 A, August 30, 1991.

[106] ibid.

[107] Textile Asia, January 1989 quoted in Swasti Mitter "Technological Trends in the Garment Industry of Developing Countries, With Special Reference to Human Resource Development and Women's Training", paper prepared for UNIDO, June 1989.

of a multiskilled labour force at production and management levels is the emerging trend which is to benefit both the industry but also to 'bind young and efficient female workers to the clothing industry' by offering better working conditions and wages.[108] Unfortunately, there are no data on how successful this new strategy has been in respect of female workers making inroads into managerial and technical positions in the garment industry. The enrolment percentage of women in courses relevant to the textile/garment industry shows a high level of participation in fashion, clothing, and technology, and graphic design. In contrast, women have fared less well numerically in engineering and computer studies, skills most needed for the higher level managerial and technical positions.[109]

The information on **Taiwan Province of China** is very sketchy at best. But it seems, like in Hong Kong, that female employment does not significantly shift up the "internal ladder" in the textiles and garments branches; rather, the shift is out of these industries altogether, and predominantly into clerical work or the lower employment grades in electronics, depending on the women's skills and educational background.

In the **Korean** textiles industry, employment is dominated by unskilled females, but women also account for 22 per cent of salaried staff which is a much higher rate than in any other economic activity.[110] Electronics is the most rapidly expanding employer of women in manufacturing, but here the share of salaried women amounts to no more than a few percentage points yet. The same is true in the other growth industries and in the great majority of non-industrial activities exhibiting rapid growth.[111] The prospects for a clear shift to the higher industrial employment categories in the wake of structural change therefore seem dim: the expanding industries (and services) have as yet little to offer. The contracting textile industry is unlikely to witness an expansion of the salaried staff category - even if the share of senior employees would rise, contraction would make itself felt here as well.

An aspect related to the professional mobility of women in Korea is the widening gap between two major groups within the female manufacturing labour force: unmarried and married women. Unmarried women are more mobile between jobs and are increasingly finding better paid employment. The less attractive jobs are thus more and more filled by married women whose educational levels are likely to be lower - because they belong to an older generation and/or because, being responsible for the household, they have no time for refresher courses.[112] This implies that their mobility between jobs will be lower. The years spent at home with the children, moreover, have negative implications for their seniority in the work environment, similar to the Japanese situation. This group would therefore be particularly vulnerable in the restructuring process. These remarks may well apply to the other economies.

In **Singapore**, the decline in female employment is attributable to both increased automation and rising labour costs. Women were more affected by increased automation than

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[108] ibid.

[109] ibid

[110] The salaried staff category includes all employees from clerical workers upwards; the actual share of professional and managerial level personnel probably is rather small.

[111] Marina Thorborg, "Korea Programme on Women", UNIDO mission report, January 1992.

[112] Heyzer, N. (ed.) "Daughters in Industry - Work skills and consciousness of women workers in Asia", Kuala Lumpur 1988.

men because they are mainly found among the low-skilled production workers. And while their pay was certainly low by local standards, it had already become high enough to encourage the relocation of some of the remaining unskilled labour-intensive operations to countries with lower labour costs. In the garment branch, less affected by automation and evidently less subject to rising labour costs due to numerous small-scale/family operations where wages tend to be lower, female employment remained more or less stable.[113]

Within Singapore's textile industry, there are few signs that the quantitative decrease of employment is at least partly compensated by an increasing participation of women at the higher occupational levels. Women have instead shifted to low-skill but usually better paid jobs in other high-growth industries, especially electronics, and to clerical occupations.

The concern for future female employment is thus not job losses but the type of skills an industry requires and whether women workers are able to fill the new job opportunities at all skill levels.[114] No doubt many women workers will be able to translate their traditional skills of manual dexterity for the new data entry and manual operating jobs, given their present skills profile and assuming labour mobility and training/ retraining for such operations. But will women be able to meet the higher skill levels required such as in electronics engineering, systems analysis, design and management in the new computer and computer related industries? The answer appears ambiguous for the immediate future. Higher skills at the executive officer level require analytical and conceptual ability and theoretical knowledge in a particular technical field where women are now highly underrepresented.

The skills required could also be of an organizational nature. In the garment industry, for example, where technological change has so far not had a major impact, organizational innovations would help the remaining firms in the NIEs and Japan to remain competitive with low-wage countries. This would require an increase in the number of managers, marketers, etc. In the textile industry, a higher level of organizational (apart from technological) sophistication is also needed now.

6.4 Education and training

The evidence of the position of women in the process of building up technological capabilities is rather sketchy and mostly confined to enrolment figures in various educational and training institutions. However, evidence is missing on women's participation in in-service training which is an important vehicle for skill development and adaptation to the changing technology environment in the higher stages of industrial development. Readily accessible information on higher-level training and education specifically aiming at the textile/garment subsector was available only for two economies, Hong Kong and the Republic of Korea. Thus, use is primarily made of available data on training and education in technical and management subjects which are not only relevant to the textile/garment subsector but also increase the chances for women's general occupational mobility.

UNESCO data, excluding Taiwan Province of China, show that female participation in primary and lower secondary education[115] is close to 100 per cent in all four economies.

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[113] ibid

[114] ibid.

[115] UNESCO-ISCED level 2

Table 9 presents enrolment ratios for the first, second and third level of education. For the total secondary enrolment[116], the female participation is over 70 per cent, with the Republic of Korea and Japan approaching 100 per cent. It is also interesting to note that the representation of female students in total secondary school enrolment is almost equal to that of male students. The percentage of female students in vocational training is not as high, except for Japan and the Republic of Korea. At the tertiary level of education female participation is highest in Japan and the Republic of Korea with about 25 per cent of the relevant age group. The proportion of female students in total tertiary student enrolment is over 30 per cent.

Table 9: Students Enrollment Ratios (gross)

		1st level	2nd level	3rd level
Hong Kong (1987)	Male	100*	71	16.7**
	Female	100*	75	9.3**
	% female in total secondary level		49	
	% female in vocational		32	
	% female in tertiary			34.5
Japan (1989)	Male	100*	94	36.8
	Female	100*	97	24.2
	% female in total secondary level		49	
	% female in vocational		47	
	% female in tertiary			38.5
Korea (1990)	Male	100*	88	51.4
	Female	100*	85	25.9
	% female in total secondary level		48	
	% female in vocational		53	
	% female in tertiary			31.3
Singapore (1989)	Male	100*	68	9.7**
	Female	100*	71	6.4**
	% female in total secondary level		50	
	% female in vocational		23**	
	% female in tertiary			41.9***

* Nett; ** 1980; *** 1984
Source: UNESCO 1991, Table 3.2 and 3.12

In training and education specifically aiming at providing qualified personnel to manufacturing and to the economy in general, participation rates of women are still rather low. In **Japan**, for example, 44.6 per cent of men in junior colleges study engineering as opposed to 1.3 per cent of women; social sciences, which include informatics and economics, are studied by 10.5 per cent of women as opposed to 30.0 per cent of men.[117] In vocational training, although women outnumber men, the subjects chosen are on the whole the traditional "feminine" ones such as home economics. Figures on university education reveal a similar pattern but there are signs of more women branching into law, economics, engineering and other natural sciences (see Table 10). Only 16.5 per cent of the female students were enrolled in business related courses.

Equal treatment of the sexes in in-house training of firms is stipulated by the law in Japan, but a large majority has evidently not given women equal access to such training yet.[118] The Government is active in the in-service training field, providing technical and financial

[116] UNESCO-ISCED level 2 and 3

[117] Prime Minister's Office, Japan (PMO), "Japanese women today", n.p. 1990.

[118] ibid.

Table 10: Third Level: Students by Level and Field of Study

Country / Field of Study	Year	Students by ISCED level of programme											Students all levels 1980		
		Level 5			Level 6			Level 7			All levels					
		(1)	(2)	% F	(3)	(4)	% F	(5)	(6)	% F	(7)	(8)	% F	(9)	(10)	% F
HONG KONG	1984															
TOTAL		60,324	20,799	34.5	11,455	4,068	35.4	5,085	1,687	33.3	76,844	26,542	34.5	38,153	9,743	25.5
Education Science		4,470	3,117	69.7	-	-		1,537	691	45.0	6,007	3,808	63.4	1,321	593	44.9
Humanities and Religion		2,169	1,273	58.7	2,211	1,478	66.8	277	103	37.2	4,657	2,854	61.3	2,412	1,439	59.7
Fine and Applied Arts		1,328	602	45.3	210	110	52.4	8	6	75.0	1,546	718	46.4	768	321	41.8
Law		4	3	75.0	275	153	55.6	94	41	43.6	373	197	52.8	248	117	47.2
Social and Behavioural Science		1,936	984	50.8	1,612	794	49.3	334	135	40.4	3,882	1,913	49.3	2,478	1,234	49.8
Commercial and Business Adm.		16,503	9,380	56.8	1,140	363	31.8	1,551	434	28.0	19,194	10,177	53.0	9,109	3,895	42.8
Mass Communication & Doc.		877	540	61.6	123	70	56.9	7	4	57.1	1,007	614	61.0	109	60	55.0
Home Economics (Dom. Science)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Service Trades		933	401	43.0	798	141	17.7	56	10	17.9	1,787	552	30.9	-	-	-
Natural Science		1,238	269	21.7	1,427	297	20.8	198	52	26.3	2,863	618	21.6	2,079	409	19.7
Mathematics & Computer Science		2,099	572	27.3	404	75	18.6	5	1	20.0	2,508	648	25.8	1,524	392	25.7
Medical & Health-related		1,172	496	42.3	1,105	211	19.1	182	85	46.7	2,459	792	32.2	1,721	455	26.4
Engineering		20,127	468	2.3	1,365	45	3.3	654	34	5.2	22,146	547	2.5	13,927	371	2.7
Architecture & Town Plng.		1,270	123	9.7	285	52	18.2	34	11	32.4	1,589	186	11.7	255	46	18.2
Trade, Craft & Ind. Pgms.		3,817	1,353	35.4	-	-	-	94	58	61.7	3,911	1,411	36.1	1,652	397	24.0
Transport & Communications		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other and Not Specified		2,381	1,218	51.2	500	287	53.4	34	22	64.7	2,915	1,507	51.7	255	14	5.5
JAPAN	1989															
TOTAL		508,788	438,721	86.2	2,088,984	582,140	27.9	85,263	13,076	15.3	2,683,035	1,033,937	38.5	2,412,117	791,264	32.8
Education Science		80,817	80,001	99.0	135,691	79,323	58.5	4,953	1,850	37.4	221,461	161,174	72.8	237,421	171,509	72.2
Humanities and Religion		115,870	113,989	98.4	315,457	202,605	64.2	9,385	3,533	37.6	440,742	320,127	72.6	345,474	229,650	66.5
Fine and Applied Arts		28,376	20,902	89.4	47,065	30,563	65.0	1,540	773	50.2	71,921	52,243	72.6	68,709	48,723	70.9
Law		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Social and Behavioural Science		70,486	50,972	71.9	802,164	111,261	13.9	8,331	1,777	21.3	881,981	164,010	18.6	730,950	83,223	11.4
Commercial and Business Adm.		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Mass Communication & Doc.		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Home Economics (Dom. Science)		115,313	115,013	99.7	40,664	40,233	98.9	453	426	94.0	156,454	155,672	99.5	135,773	135,304	99.7
Service Trades		-														
Natural Science		-	-	-	46,856	8,223	17.5	7,915	805	10.2	54,771	9,028	16.5	46,863	6,251	13.3
Mathematics & Computer Science		331	286	86.4	17,141	3,472	20.3	1,232	121	9.8	18,704	3,879	20.7	15,202	3,015	19.8
Medical & Health-related		25,917	22,739	87.7	117,719	43,866	37.3	14,096	1,886	13.4	157,732	68,491	43.4	118,675	49,296	41.5
Engineering		42,275	6,290	14.9	384,188	13,000	3.4	30,934	1,020	3.3	457,397	20,310	4.4	396,856	7,513	1.9
Architecture & Town Plng.		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Trade, Craft & Ind. Pgms.		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Transport & Communications		901	20	2.2	1,687	74	4.4	95	6	6.3	2,683	100	3.7	2,862	5	0.2
Agriculture		3,297	1,142	34.6	60,192	12,085	20.1	5,105	624	12.2	68,594	13,851	20.0	61,525	7,514	12.2
Other and Not Specified		29,800	27,318	91.7	120,173	37,430	31.1	1,234	256	20.7	151,207	65,003	43.0	177,876	43,737	24.6

Table 10 (cont.)

Country / Field of Study	Year	Students by ISCED level of programme: Level 5 MF (1)	Level 5 F (2)	Level 5 % F	Level 6 MF (3)	Level 6 F (4)	Level 6 % F	Level 7 MF (5)	Level 7 F (6)	Level 7 % F	All levels MF (7)	All levels F (8)	All levels % F	Students all levels 1980 MF (9)	F (10)	% F
KOREA, REPUBLIC OF	1989															
TOTAL		315,135	115,484	36.6	1,186,770	362,294	30.5	81,171	17,563	21.6	1,583,076	495,341	31.3	615,452	148,076	24.1
Education Science		16.061	15.391	95.8	102.619	58.921	57.4	13.660	5.063	37.1	132.340	79.375	60.0	74.376	36.511	49.1
Humanities and Religion		17.828	6.585	36.9	194.450	97.265	50.0	8.905	2.883	32.4	221.183	106.733	48.3	59.646	18.604	31.2
Fine and Applied Arts		25.779	17.005	66.0	50.049	32.075	64.1	3.314	2.389	72.1	79.142	51.469	65.0	25.619	16.972	73.5
Law		929	160	17.2	49.826	5.974	12.0	1.823	123	6.7	52.578	6.257	11.9			-
Social and Behavioural Science		4.363	2.163	49.6	76.221	17.618	23.1	5.729	948	16.5	86.313	20.729	24.0	111.685	12.496	11.2
Commerical and Business Adm.		34.956	12.370	35.4	207.336	31.163	15.0	14.708	848	5.8	257.000	44.381	17.3	./.	./.	./.
Mass Communication & Doc.		1.785	1.454	81.5	11.472	5.787	50.4	739	245	33.2	13.996	7.486	53.5	./.	./.	./.
Home Economics (Dom. Science)		12.338	10.892	88.3	33.880	32.591	96.2	1.072	1.028	95.9	47.290	44.511	94.1	./.	./.	./.
Service Trades		10.605	4.935	46.5	-	-		-	-	-	10.605	4.935	46.5	./.	./.	./.
Natural Science		-		-	61.851	18.522	29.9	3.958	853	21.6	65.809	19.376	29.4	52.146	28.184	54.0
Mathematics & Computer Science		18.570	6.128	33.0	62.896	17.526	27.9	2.119	426	20.1	83.585	24.080	28.8	./.	./.	./.
Medical & Health-related		35.199	25.056	71.3	39.937	14.083	35.3	7.549	1.659	22.0	82.685	40.828	49.4	41.420	18.900	45.6
Engineering		51.239	2.461	4.8	172.740	4.359	2.5	10.907	236	2.2	234.886	7.056	3.0	209.638	10.103	4.8
Architecture & Town Plng.		14.547	1.211	8.3	25.032	2.192	8.8	1.195	62	5.2	40.774	3.465	8.5	./.	./.	./.
Trade, Craft & Ind. Pgms		35.056	2.432	6.9	-	-	-	-	-	-	35.056	2.432	6.9	./.	./.	./.
Transport & Communications		5.443	947	17.4	-	-		-	-		5.443	947	17.4	./.	./.	./.
Agriculture		20.542	2.982	14.5	73.319	14.706	20.1	3.532	367	10.4	97.393	18.055	18.5	40.092	4.246	10.6
Other and Not Specified		9.905	3.282	33.1	25.142	9.511	37.8	1.961	433	22.1	37.008	13.226	35.7	632	60	9.5
SINGAPORE	[illegible]															
TOTAL		16.677	4.791	28.7	16.646	9.108	54.7	1.869	860	46.0	35.192	14.759	41.9	23.256	9.087	39.1
Education Science		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.653	77.4
Humanities and Religion					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fine and Applied Arts		-	-	-	-		-	-	-	-	-	-	-	-	-	-
Law					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Social and Behavioural Science																./.
Commerical and Business Adm.		1.357	912	67.2	2.524	1.820	72.1	289	40	13.8	4.170	2.772	66.5	2.380	1.321	55.5
Mass Communication & Doc.																
Home Economics (Dom. Science)																
Service Trades			-	-	-	-		-		-	-	-	-	-	-	-
Natural Science					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mathematics & Computer Science		[illegible]	[illegible]	[illegible]							[illegible]	[illegible]	[illegible]			
Medical & Health-related		-	-	-	1.051	347	33.0	70	23	32.9	1.121	370	33.0	937	372	39.7
Engineering		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Architecture & Town Plng.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trade, Craft & Ind. Pgms		-	-	-	-	-	-				-			-	-	-
Transport & Communications		[illegible]		[illegible]							[illegible]		[illegible]	[illegible]		
Agriculture																
Other and Not Specified		1.352	280	20.7							1.352	280	20.7	668	115	17.2

Source: UNESCO Statistical Yearbook 1991.

assistance to firms, and there are special training facilities for new graduates and people wishing to change their jobs.[119] In theory, the Government should therefore be in a strong position to enforce equal representation of the sexes in training.

In the Republic of Korea, at the high school level, 0.9 per cent of the girls are enrolled in vocational high schools, while 16.1 per cent of the boys are enrolled in vocational/technical high schools. Girls, on the other hand, predominate in the commercial high schools, visited by 27.5 per cent of all female high school students and 6.4 per cent of the males.[120] A similar pattern could be also observed at the university level (see Table 10). This would indicate that a relatively large number of females are provided with useful training for the service sector but are considerably less equipped when it comes to technology relevant subjects needed in industry.

The Korean Government has been very active in stimulating vocational training from basic to college levels and using fiscal and training quota policies to force the business community to share the costs. The setting of a training quota was particularly unpopular in the textile industry which felt it had no use for a highly trained workforce.[121] However, this situation is changing as the companies, facing increasing labour shortages, are forced to reorient their manpower planning and training approach to survive the competition from the lower wage Asian newcomers on the one hand, and the higher value added producers in the industrially advanced countries on the other hand. The new strategy to shift into a high-value-added market entails promotion of own brandnames. This requires new types of skills. Initiatives have been taken both in the private and the public sector to redress the emerging skill gap.

Table 11: Female Enrolment in Clothing-related Courses at Junior Colleges and Universities of the Republic of Korea

	No. of Departments	Enrolments Total	Female	F%
Junior Colleges				
Clothing	2	631	631	100
Clothing and Textiles	1	117	59	50
Dress-making	17	3,151	2,904	92
Universities				
Clothing and Textiles	6	882	835	95
Clothing	21	3,190	3,063	96
Clothing and Life	3	630	614	97
Clothes Design	3	423	305	72
Clothes	10	1,912	1,590	83

Source: Statistical Yearbook of Education (1988), the Ministry of Education in Swasti Mitter, "Technological Trends in the Garment Industry of Developing Countries: With Special Reference to Human Resource Development and Women's Training", paper prepared for UNIDO, June 1989.

[119] ILO, "Diversification of women's employment and training", Bangkok, 1987.

[120] Marina Thorborg, "Korea Programme on Women", UNIDO mission report, January 1992.

[121] Bernard Salome and Jacques Charmes "In-Service Training, Five Asian Experiences", OECD 1988.

In the programmes for developing the country as an international fashion centre, efforts are also being made to give women adequate training specific to fashion and design. Some universities and colleges now have departments to generate expertise in the area of fashion and clothing. Women's participation in the courses is high (see Table 11). In addition, specialized training in clothing is provided through in-corporation vocational training courses, authorized private institutes, public run vocational centres, and the Seoul City Women's Welfare Centre.[122] However, the impact of the training effort has not yet been felt in the clothing industry which still suffers from labour shortages due primarily to young female workers leaving for better jobs in the electronic plants.

In **Singapore**, the representation of women undergraduates in technical and engineering fields is also low (see Table 10). In the polytechnics which offer courses in engineering, architecture and building sciences and other 'hard' sciences, men students outnumbered women students two to one and three to one, respectively.[123] Women are however overrepresented in business studies, and this would be of positive value in an era where services and the service component in industry are acquiring a rapidly increasing importance. In-service training is less common for women than for men. Due to sex-biased secondary school curricula where technical education is compulsory for boys but not for girls, women also have more problems in successfully participating in the various types of training on offer.[124]

In **Hong Kong**, female students' representation in technically oriented subjects at the university level exhibits a pattern similar to the economies already reviewed. In the field of textiles and garments Hong Kong has now achieved a status of an international design centre in its own right. This has been made possible by knowledge and experience acquired trough collaborative partnerships with fashion firms from developed countries and concentrated efforts to encourage local design talent, and to develop management capacity. The effect of the introduction of computer technology has been to upgrade the skills of the workforce - particularly in the preassembly stages of production. The trend has been to produce multiskilled workers conversant with management, computing and de. ɜn to achieve individual design, speedy delivery and innovative workplace organization.[125]

There are five higher education institutions in Hong Kong which offer programmes aimed at preparing new recruits for employment in the local textiles and clothing industries. Statistics presented in Table 12 show that women have made substantial entry into some of the courses. This is particularly the case in the Institute of Textiles and Clothing which is perhaps the largest and most successful centre of clothing industry studies anywhere in the world. Students in the Fashion Clothing Department, which has an impressively large female participation, are frequent competitors in the international design competition; also its Management Studies Department has trained some of the top executives in the Hong Kong clothing industry.[126] Although women's entry into fashion oriented courses is relatively large, women fared less well numerically in engineering and computer studies, skills most needed for careers in managerial and technical positions (see Table 12).

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[122] Swasti Mitter, "Technological Trends in the Garment Industry of Developing Countries: With Special Reference to Human Resource Development and Women's Training", paper prepared for UNIDO, June 1989.

[123] Heyzer, N. (ed.) p.370, "Daughters in Industry - Work skills and consciousness of women workers in Asia", Kuala Lumpur 1988

[124] ibid.

[125] Swasti Mitter, "Technological Trends in the Garment Industry of Developing Countries: With Special Reference to Human Resource Development and Women's Training", paper prepared for UNIDO, June 1989.

[126] Apparel International, April 1988, pp.33-34.

Table 12: Percentage of Female Students in the Total Enrolment of Relevant Courses in Hong Kong (pt = part-time; ft = full-time)

A	**Vocational Training Council (Technical Institute)**		
	Certificate Courses:		
(i)	Clothing	ft 73.6%	pt 57.6%
(ii)	Computer Studies	ft 37.5%	pt 39.6%
(iii)	Textiles	ft 56.6%	pt 40.4%
(iv)	Design (graphic)	ft 41.8%	pt 33.8%
B	**City Polytechnic of Hong Kong**		
(i)	BA in Information Technology		ft 7.4%
(ii)	BSc in Computing Studies		pt 18.9%
(iii)	BSc in Computing Studies (sandwich course)		pt 16.3%
(iv)	Higher Diploma in Computing and Information Technology		ft 34.5%
(v)	Professional Diploma in Computing and Information Technology (postgraduate)		pt 30.9%
C	**Hong Kong Polytechnic**		
	Institute of Textiles and Clothing		
(i)	Higher Diploma in Fashion and Clothing Technology		ft 67.4%
(ii)	Higher Diploma in Textile Chemistry		ft 16.4%
(iii)	Higher Diploma in Textile Technology		ft 30.0%
(iv)	Higher Diploma in Textile and Clothing Studies		ft 30.4%
(v)	Professional Diploma in Fashion and Clothing Technology (sandwich)		pt 61.8%
(vi)	BA (Hons) in Textiles and Clothing (sandwich)		pt 61.6%
	Swire School of Design		
(i)	Diploma in Graphic Design		ft 60.8%
(ii)	BA in Design		ft 47.9%
	Computer Studies		
(i)	Higher Diploma in Systems Analysis		ft 35.5%
(ii)	Higher Diploma in Software Engineering		ft 30.0%
(iii)	BA in Computer Studies (sandwich)		pt 36.8%

Source: Government Statistics, Hong Kong.

The experience of the NIEs demonstrates the importance of a universal primary education and widespread secondary school attendance as an essential building block in the process of industrial skill development. However, it is not only the formal education which suffices in times of increasing speed and complexity of technological changes. The ability of these economies, enhanced by government initiatives, to establish closer links between the educational and the production-system where the latter provides a more specialized and complementary training and also inputs into R&D, has been one of the important factors facilitating their economic growth.[127] Unfortunately, the review of the evidence provided in this section could give only limited information on how women have fared in this process. In spite of anti-discriminatory legislation and in spite of a sometimes higher than average rate of growth in participation levels, women are still heavily underrepresented in the crucial training and educational fields, even if the lower numbers of women involved in the corresponding economic activities are taken into account.

6.5 Conclusions

The Asian NIEs have clearly left the low-wage, labour-intensive industry stage behind and are moving to technology intensive manufacturing with the attendant need for highly skilled human resources. Japan is already one step further. It has been characterized as being at the "brain intensive" stage of development, marked by a predominance of activities based on knowledge and information outside the manufacturing sector.[128] But the trend away from manufacturing is already visible in the NIEs as well, with an increasing employment in the service sector, including activities normally classified as services within the manufacturing sector. These activities "represent highly productive inputs into the production system and have very little, if anything, in common with the traditional notion of services being low-skill, low-production activities."[129]

The textile industry is rapidly becoming marginalized in the process, although a "hard core" of highly sophisticated textile firms will no doubt remain part of the industrial landscape. The declining share of female labour in the textile industry is indicative of changes in skill requirements for which women seem to be less prepared than men. What can be concluded is that the textile branch is becoming of relatively small importance as a supplier of female jobs. Skill upgrading/diversification of the female employees is needed if their share is to be maintained. In contrast, the garment branch is as yet overwhelmingly characterized by female labour. While this situation is unlikely to change in the near future, there is a longer-term need for skill improvement and diversification in view of the industry's need to respond to changes in demand and to anticipated changes in technology.

Women are moving into services or into the growth industries; the services would generally be the domain of those with better educational levels, which are definitely rising. In the new growth sectors and branches, women are as yet predominantly found at the lower levels; fast growth is noticeable at the higher professional levels, but the numbers involved are still small, and the documentation does not indicate whether the key economic growth sectors are the locus of this fast growth. A new group of usually better skilled marginal workers seems to be emerging: the home workers and subcontractors who are dependent on information intensive activities. The most vulnerable group is older married women doing unskilled work, their skill/education levels being too low to be of much use in the rapidly changing economy.

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[127] For a detailed examination of the role of in-service training in the NIEs see Bernard Salome and Jacques Charmes, "In-Service Training Five Asian Experiences", OECD, 1988.

[128] UN/ESCAP, "Industrial restructuring in Asia and the Pacific", Bangkok 1991.

[129] ibid., op.cit. p.42.

The educational and training system is responding with varying means and degrees of success in the individual economies. But women are still a minority of the students in the subjects that matter, particularly with regard to skills and knowledge needed in manufacturing. The evidence about textiles/clothing specific training in Hong Kong and the Republic of Korea suggests that although women's representation in some of the courses is quite impressive, their representation in subjects required for higher technical and managerial posts remains very low.

Women appear to be better represented in education and training for services. Seen in the broader perspective of a shift towards service-dominated economies, the situation is therefore not altogether unfavourable for women, even if they have to cope with other obstacles such as biased hiring practices, etc. which have not been discussed here. It emphasizes, however, the need to further increase the participation of women in the relevant types of education and training; particular attention would have to be paid to those female workers in low-skill positions who are likely to be marginalized in the process.

CHAPTER 7
SUMMARY AND EMERGING ISSUES

7.1 Summary

7.1.1 Global developments

In recent years, international competition has spurred leading manufacturers in the advanced industrialized countries to speed up technological innovation in textile production (spinning, weaving and finishing) as a means to save labour, improve quality and achieve overall rationalization effects in production. Technological advance is also taking place in the garments industry, although to a much lesser extent. The innovations are not only a response to changing costs of factor inputs but also increasingly to changes in market conditions (e.g. rapidly changing fashions, demand for quality products) in the high-income markets.

The technology gap between industrialized and developing countries is gaining more importance than pure factor cost advantage in establishing competitive strength on international textile and garment markets. Existing skill and technology levels, coupled with low labour costs, may still ensure the cost advantage of the developing countries in domestic and in some regional markets, but if they wish to remain or become competitive in international markets, they will need to pay more attention to quality, design, speed and reliability of delivery. The new technology is exactly geared towards this aim.

These developments have important consequences for the labour force. Skills and know-how must not only be improved, but are also required in fields transcending the traditional industrial framework, as managerial and marketing expertise increase in importance. Moreover, the long-term trend for the textile and garments industries is to lose much of their importance as providers of employment, particularly for women - high-tech industries and the services sector are increasingly taking on this role.

This document explored key issues related to the effect of the introduction of the new technologies on some of the Asian countries, in particular the actual/expected implications for the size, composition and skill levels of the female labour force. The focus was mainly on the traditionally sizeable female segment of the labour force in the textile and garment industries in Bangladesh, Thailand and Indonesia. The document also examined the changes taking place in Asia's newly industrializing and advanced economies. Placing the development of the textile and garment industry in a longer time perspective helped to elucidate issues which are relevant not only to an ex-post but also to an ex-ante analysis.

Technological developments

From the late 1970s onwards, the textile industry in the developed countries has been characterized by the introduction of micro-electronics-based technology and the automation of industrial processes. The NIEs have also introduced these technologies or - as in the case of Singapore - have relocated production to lower-wage countries. The new technologies have allowed the various production stages to become one continuous process of interrelated activities, resulting in higher quality and flexibility which yields a faster response to changing market conditions. A full exploitation of these technological improvements however is dependent on further complementary changes in organization and management. The major technological improvements cover:

- raw material handling;
- yarn spinning methods;
- loom speeds and weaving quality;
- dyeing, printing and finishing equipment;
- carpet manufacturing;
- automation of machinery functions, machine self-diagnosis and self-correction, automatic design and automatic interlinking of processes.

During the 1990s, rapid response to market conditions is likely to become an even more important force behind technological innovation and is likely to focus on increases in speed and flexibility rather than on cost-cutting.

Technological change in the garments industry, though less rapid than in the textile industry, is making an increasingly strong impact, especially at the pre-assembly stage. The most significant innovations are:

- computer-aided design (CAD);
- computer-numerical control (CNC) cutting systems;
- pre-assembly computer-aided manufacturing (CAM).

CAD has in recent years become commonplace in the NIEs; as its costs decrease, it will spread to other developing countries as well.

At the assembly stage, representing 80 per cent of the MVA and the workforce in the industry, technological change has so far been relatively modest. Improvements mainly take the form of micro-electronic control units which are attached to the standard industrial sewing machine to handle the more complex tasks. These improvements can either be used to speed up production (special task dedicated machines) or to increase the flexibility of production (multi-purpose machines). The latter improvements require a combination of higher production and management skills. It is expected that the 1990s will see major technological innovations in this area.

The impact of automation on employment has been significant: in the EC, employment in the textile and clothing industry as a whole has declined by 40 per cent in the past 15 years, and the forecast for the 1990s is a loss of 700,000 to 1 million jobs in the textile sector alone. These losses mainly concern operators and unskilled workers; the share of technical and managerial personnel has increased, as the new technologies require specialized engineering, maintenance, design, computer and marketing skills.

Organizational changes

Organizational changes complement the technological drive towards greater market responsiveness. These changes do not only have an impact on production as such but also on the relationship between suppliers and buyers. In production, the following new organizational characteristics have emerged:

- greater flexibility with increased emphasis on skills, and on a multi-skilled workforce;
- reorganizing production as a group activity ("quality circles",etc.);
- closer management-workforce co-operation;
- increasing role of industrial services, often provided by external suppliers;

- restructuring of the industry (increasing concentration and vertical integration of textile and clothing production, but also emergence of small and medium-sized firms serving as specialized sub-contractors or focusing on specific market niches).

In the field of buyer-supplier relations, the following developments are taking place:

- textile producers and garment makers co-operate with retailers in design teams;
- price is no longer the only important determinant of sourcing: elements such as quality, timely delivery and technical co-operation between buyer and supplier also play a major role;
- lead times are reduced and production runs shortened.

The intensification of the buyer-supplier relationship means that the availability of first-class telecommunications networks and international (air) transport connections have become an important competition factor for the producer countries.

7.1.2 Country-level characteristics and developments

Following the schematic outline of industrial development stages presented in chapter I, the following sub-sector characteristics and developments were identified in the countries selected for closer study.

Resource endowments

The presence of natural resources - mainly cotton, but in the case of Thailand also silk - has been an important initial factor in the emergence of the textile industry in Bangladesh (when it was a part of India), Indonesia and Thailand. In all three countries the development of modern textile manufacturing, especially for export, was based on an extensive use of abundant low cost labour. This factor has made the industry an important source of employment and also secured the competitive advantage in the export markets. Bangladesh and Indonesia have still retained this relative advantage up till now but this is no more the case of Thailand.

In Thailand, local raw material production has not grown sufficiently and cotton yarn is now imported on a large scale, as well as man-made fibres. The quality of domestic raw silk also constitutes a bottleneck to the modernization of the handloom production, but joint R&D efforts are being undertaken by the Government and private business to introduce new varieties of raw silk suited to more advanced technology. In Indonesia, local production of man-made fibres has developed sufficiently to cover most of the industry's requirements, but most of the raw cotton is imported.

The modern garments industry has developed much later than the textile industry in all three countries. At the initial stage of the import substitution period, the industry benefited from upstream linkages with the textile sector in Thailand and Indonesia. Today, Thailand relies increasingly on imported textiles, because Thai textile producer[illegible]nger capable of providing the quantity, quality and variety of cloth required for [illegible]ts. In Indonesia, the local fabric sourcing still satisfies almost 80 per cent [illegible]ustry's demand. In Bangladesh, with no substantial local demand for manufactured garments the development of the garment industry was export driven from the start. Export-oriented garment manufacturing relies heavily on imported textiles since domestic production of textiles is geared towards less quality and variety demanding markets.

In all three countries the competitive strength of the garment industry has been built upon cheap labour force, predominantly women.

The sub-sector's role in manufacturing

In Bangladesh, the textile branch accounts for some 35 per cent of MVA, down from over 50 per cent in the early 1970s. In Thailand and Indonesia (which are further along the path to a modern, diversified manufacturing sector) the textile sector accounted for 11 per cent and 10 per cent of MVA, respectively, at the end of the 1980s. The industry has maintained its position as one of the largest employers of manufacturing labour force in Bangladesh but has been surpassed by other industrial branches in Thailand and Indonesia. The importance of the industry as an export earner has declined in all three countries. In the case of Thailand and Indonesia this is largely explained by the divergence of output towards the local market.

In Bangladesh, a large proportion of the textile industry is still strongly characterized by traditional cottage industries (the handloom sector) although the pre-liberation period in the early 1960s saw a rapid expansion of integrated mills. Small scale industries also continue to play a very important role in Indonesia and Thailand (silk production). Indonesian small scale industries have made more technical progress than those in Bangladesh and Thailand. In Thailand, however, improvements in organization and management of sub-contracting has increased the number of home-based silk producers and contributed to the growth of the silk industry. A larger proportion of the large scale enterprises are publicly owned in Bangladesh than in Thailand and Indonesia whereas local and foreign investment (private or joint ventures) dominate in industry's landscape.

The MVA share of the garment industry is quite modest in all three countries: 1 per cent in Bangladesh, 7 per cent in Thailand, and 1.8 per cent in Indonesia. But the trend of these figures is still upwards, and the branch is a major contributor to foreign exchange earnings in spite of its low MVA share, especially in Bangladesh. Cheap, mass-produced clothes are still the main export item; in the Indonesian and particularly the Thai garment industries there is now a trend towards quality products based on local design and diversification.

In all three countries, small and medium-size enterprises predominate, often sub-contracting for foreign firms which are responsible for design, marketing, etc. Medium and large-scale enterprises only play a significant role in Indonesia.

Technological capabilities

Overall, technology levels in the textile industry in the three countries have not changed much since the 1960s. Technological stagnation is most evident in Bangladesh. There is as yet no sign of automation in the large-scale mills, and traditional handloom weaving predominates in the informal sector, although semi-automatic handlooms have been introduced on a modest scale. Attempts are being made to form women's co-operatives for the operation of such looms.

In Thailand and Indonesia, advanced technologies are now being introduced, especially in foreign-owned mills producing synthetic textiles. But these technologies cover only isolated aspects of production (such as spinning) - there are no integrated modern mills yet. Thai producers have partly compensated the lack of technological progress by better organization and maintenance. As indicated above, efforts are also being made to modernize the traditional Thai silk industry. In Indonesia, power looms have become common in cottage industries.

In all three countries, there is a traditional female presence in the textile industry, although in Bangladesh women were traditionally confined only to yarn processing and excluded from the weaving activities. This explains the unusually low women's participation in the textile sector in Bangladesh, about 10 per cent compared to about 80 per cent in Thailand. Although no direct estimates on female participation in the textile labour force are available for Indonesia, the rate could be estimated between 40-60 per cent.

Small scale enterprises and sub-contracting represent an important organizational structure for female employment in all three countries. Introduction of a semi-automated loom in the traditional handloom sector and formation of female cooperatives represents new opportunities for female employment as weavers in Bangladesh. In the modern sector, the outdated technology and a heavy reliance on physical strength is a real obstacle for increasing female participation. The prevalence of traditional values and strong competition from men in the saturated labour market makes it even harder for women to enter the modern sector.

In Thailand, it is too early to judge the effect of the recently introduced modernization of the traditional silk industry on the overall female employment in this sector. It could be speculated that some of the newly created opportunities for female factory employment, mostly for young and unmarried women, will be at the expense of women working as sub-contractors from their homes. In Indonesia, the available information suggests a decrease in employment opportunities in the traditional handloom sector and also in small scale enterprises as a result of modernization and competition from the modern, large scale sector. Up till now it seems that the growth of the modern sector may have compensated for this loss of employment.

Technology levels in the garment industry are on the whole relatively low. Most of the Thai and Indonesian firms still use standard industrial sewing machines, and only the large Thai establishments producing high-quality clothing have introduced computers for design, special sewing operations and inventory control. Garments production in Bangladesh uses simple operator-guided electric machines, although some of the EPZ firms are beginning to use computerized attachments. Local establishments extensively use second-hand machinery.

The background to female employment and employment growth in the garments industry, although more spectacular in a shorter period of time, is similar to that in textiles. It is evident that the demand for female labour has been motivated by the presence of an untapped pool of cheap labour, particularly suited to the nature of production and the type of low-skill technology. This was in some instances, especially in Bangladesh, enhanced also by the "supply push" based upon the economic necessity which has forced women to sell their labour well below the wage rate acceptable to men. Widespread subcontracting facilitated the growth of female employment in Thailand and Indonesia.

Given the fact that unsophisticated mass production still predominates in the textile and garment industry , it is not surprising that the issue of human resource development receives relatively little attention in the three countries (although Indonesia does have a textile technology institute and a modest textile/garments training programme). The situation is also slightly better in transnational firms which are more aware of the increasing importance of skills improvement.

In-plant training is generally confined to a simple on-the-job training of new employees by a more experienced machine operator. Where more structured training programmes are available, they tend to concentrate on the middle and high level technical and managerial staff amongst whom women tend to be seriously underrepresented. Only in Indonesia it was found

that a relatively large number of women occupy middle or high-level positions in the garments industry. This is largely explained by their well established role in traditional garment making.

The trend towards product diversification and higher value-added production associated with technology improvements will result in skill polarization. This tends to marginalize women in quantitative and qualitative terms: they are not only in danger of losing jobs, but also of being excluded from operations requiring new skills. These tendencies have been observed in the garment production in the EPZ in Bangladesh, in the textile and garment industries in Thailand, and the textile industry in Indonesia, although the trend is so far masked by the increase in the absolute number of employees, both men and women.

Policies

Import substitution policies formed the basis of the modern textile industry in Bangladesh, Indonesia and Thailand. After Bangladesh became independent in 1972, there was a policy shift away from promoting large mills to traditional handloom production in an attempt to cope with the serious unemployment problem. Also in Indonesia, conscious labour market policies favoured labour intensive technologies to create much needed employment opportunities.

By the end of the 1970s, export promotion became a major focus of government policies for the industry in all three countries. The background for these policies was formed by the need to increase foreign exchange earnings and to capitalize on opportunities arising from the textile industry re-location strategies of producers in the developed countries and the NIEs. Foreign investors have been attracted by favourable legislation and/or the provision of special facilities (such as the Bangladesh EPZ). Serious attempts to let domestic industries benefit from technology transfer connected to private foreign investment seem to have been made only in Indonesia.

The export promotion drive in all three countries has stimulated the demand for cheap female labour, the supply of which was increased by the decline of rural job opportunities. The result is a heavy predominance of women in the textile industry in Thailand and Indonesia. In Bangladesh, the number of women in the industry has not grown as fast. Men have retained their traditionally predominant role, partly because backward technologies require considerable physical strength and also because of lack of alternative employment opportunities. In addition, labour regulations allowing employment of women only for work which is "appropriate to women" leaves large scope for discrimination in hiring practices which are still heavily influenced by traditional socio-cultural values The adherence to values which confine women to traditional roles and sanction gender-division of labour affect not only the employer' attitudes but women's perception of themselves, as was also shown in the case of Indonesia.

Policies for garment manufacturing have been related to the export promotion drive from the start in Bangladesh, whereas in Indonesia and to some extent Thailand, import substitution provided the original impetus for the industry. In stimulating garment (and textile) manufacturing, the governments have exploited international relocation and restructuring trends which resulted from technological change and increasing wage levels in the industrialized countries. The Multi-Fibre Arrangement (MFA) and Generalised System of Preferences (GSP) have facilitated easier access to developed countries' markets for all three countries. In addition, a trade agreement with the USA in 1971 provided Thai garment manufacturers with very favourable export conditions.

There is no doubt that export promotion of the garment industry has created new possibilities for female industrial employment which have grown much faster than in the textile industry, especially in Bangladesh. There is also little doubt that the growth of the industry has been built upon the dexterity, easy subordination and low wages of the female labour force. Although the Governments in all three countries recognize the present and still untapped potential role of women in industry there are little signs of any significant measures to improve the qualitative aspects of the female labour force. Literacy rate and education levels of women are still well bellow that of men, so is women's access to relevant technical and managerial training. Also, special rules covering working conditions for women are neither observed or endorsed are often used not for the benefit of women workers, rather to their disadvantage.

The situation in Japan and the NIEs

Evidence from Japan and the NIEs shows more clearly the impact of technology changes on women's participation in the textile/garment industry and in manufacturing and economic activities in general. The importance of the labour intensive and low skill industries declines with the transition to more technology and skill-intensive development stages, and the opportunities for inter-sectoral, intra-sectoral and occupational mobility increase. The restructuring of the manufacturing sector towards capital and technology intensive industrial branches results in streamlining, in some cases shedding, of the light, labour-intensive industries and/or particular production segments of these. This has been the case of the textile and to some extent also the garment industry. The negative impact of this restructuring on the absolute and relative participation of women in the textile industry has been demonstrated. In the garment industry, slower progress in automation has been compensated by organizational changes and introduction of computerized management systems which have not had the same negative impact on women labour force.

The role of high-tech related services in economic development is increasing rapidly in the more advanced Asian countries; most of the new employment opportunities are actually created in this sector. Women do move to other industries and to the modern services sector, which shows that transferability of the basic relevant skills is not an obstacle to female employment mobility, but their occupational advancement possibilities remain quite limited. This is related on the one hand to biases within the "enterprise culture", on the other to the continuing underrepresentation of women at the relevant higher levels in education and training.

7.2 Emerging issues for the textile and garment sector and the role of women

Trade

The global market environment presents a considerable challenge to exporting countries. International trade in textiles and garments is a buyer's market: supply grows faster than demand. Bangladesh, Thailand and Indonesia now face varying degrees of competition, especially in the lower-priced segments, from the established as well as new low-wage producers in the Asian region such as China, Vietnam, Cambodia and Laos. In addition, East European countries are now becoming attractive for relocation of production from Asia: their closeness to the European markets is a distinct advantage, and the overall educational and training levels are quite high. There are however new opportunities in the emerging high-income markets of the Pacific Rim countries; and while in the present context the focus is on high-income markets, low-income markets in other regions could also be explored.

To keep up with international developments, the need for change in the textile and garments industry is particularly urgent in Thailand where the factor cost advantage has been eroded by rapidly rising wages. For Bangladesh and Indonesia, where wage rates in the sector are among the lowest in the world, the threat posed by emerging low cost producers may not be serious in the immediate future. But the changes in market conditions of their traditional export partners can have serious consequences also for the products of these two countries.

New strategies are thus needed to focus the textile and garments industry on high quality and innovative products, production flexibility, market knowledge and distribution services, short lead times and customer services - on non-price factors of competitiveness. Even the traditional low income markets for mass products have become more quality- and variety-conscious, given the large choice of suppliers in this product category. In all three countries the long-term strategy in both domestic and export markets will therefore have to incorporate improvements in the non-price factors. At present, the awareness of these factors is low, largely because they are the domain of the overseas firms who place the orders.

How much of the present mass production capacity can be converted to production for the middle and upper segments of the export markets and successfully compete with technologically advanced producers in industrialized countries; how much of the output of upgraded units can these markets absorb? Essential as they are for the future development of the sector in Bangladesh, Thailand and Indonesia, it would be unwise to rely exclusively on them.

It would seem more realistic to devise a product and marketing strategy which also aims at development of non-quota as well as regional and domestic markets. In the domestic markets of Bangladesh and Indonesia, local suppliers can still increase their competitiveness through the improvement of price-related factors. However, as indicated above, non-price factors in competition should not be ignored. Evidence of a strategy which is aware of this issue may be found in Thailand. Whatever strategy (or combination of strategies) is followed, the implication for human resource development is clear: a labour force which can also master a wide range of non-production skills (in management, design, marketing, etc.) will be essential.

Technology

The evidence from the country surveys showed that producers are at present reluctant to invest in new technology, especially in the garment sector. Given the existing product specialization and market conditions, their position has so far been rational. Moreover, there is still a substantial scope for improvements in productivity and quality without radically altering the core, "hard-ware" component, of the outdated technology. Scope for improvements exists in areas such as management, labour force training, as well as in the introduction of organizational changes in production appropriate to the local economic conditions.

In the near future, however, manufacturers in the three countries will have to come to grips with computerized technologies. The differences between textiles and garments in the speed and extent of technological changes means that the production of garments will be the least affected in the short term. The major changes so far are in the "orga-ware" and the "info-ware" component. While this implies that new combinations of manual and cognitive skills, the "human-ware" component, are required, the principal production technology has not changed. The critical one machine/one operator link in assembly is not yet broken. As this stage represents 80 per cent of the labour cost in garment making, the cost savings of other technological developments in the industry are not always immediately relevant to developing

country manufacturers. This factor, along with increasing domestic demand, is the reason why female employment in some countries (this includes NICs) in the garment sector is either stable or even growing. Human resource planning in these should however be aware of possible major breakthroughs at the assembly stage which could seriously affect the competitiveness of their garment industries in the longer term.

Technology in textiles, on the other hand, has already made great advances in the "hardware" component, and the new technologies are now being rapidly diffused in the NIEs. The loss of employment has been considerable, especially for women, who tend to become marginalized in the process of technological change. Shortages of relevant skills among the female workers are primarily responsible for their declining proportion in the textile labour force.

In the three countries, especially in Bangladesh and Thailand, the textile industry could still provide new employment opportunities for female labour in the near future. A stronger reliance of the garments industry on domestic textiles, as in Indonesia, would boost growth and labour demand in the textile industry even if labour-saving technologies are introduced. To an extent, the effect will also depend on the speed, type and extent of the new technologies that will be introduced. Examples of improved handlooms and 'women friendly' automation in textile mills in Bangladesh as well as the possibilities of automation in the silk yarn production in Thailand hold potential for increasing the demand for female labour. In addition there are many physically demanding tasks now performed by men which could be made accessible to women if available technology is employed such as hydraulics in lifting, loading, and moving materials. However, male workers and trade unions may resist such changes, and substitution of male labour performing these tasks by machinery does not, as experience shows, automatically lead to women taking over.

In the longer perspective, such opportunities for unskilled or semi-skilled work are likely to decrease. Unless women acquire the skills to move to higher-level positions in the industry, they will have to look for work in the decreasing number of branches that still require low-skilled labour, or in for example the personal services sector. However, women will not move to higher levels in the textile industry on the basis of skills and know-how alone: the overall social environment and the enterprise culture which block women's careers will also have to change fundamentally.

Human resource development

Most of the shop-floor skills required at present can be learned on the job. The only cost are short-term losses in production output, often compensated by the artificial extension of the training period during which lower wages are paid. The relatively few highly trained technicians and managers needed, and an increasing demand for low-paid semi-skilled production workers have given few economic incentives for establishing structured in-service training. Gaps can be filled by poaching of workers trained elsewhere and/or the use of expatriates. The rather short business time horizons also militate against investment in training.

As producers are not motivated to invest in what to them is a high risk proposition in the present business environment, Governments will have to assume the role of an initiator, co-ordinator, and cost-sharing partner of R&D and training schemes. This is of crucial importance in the development of the relevant skills and know-how, as proved by the experience of the NIEs. At the same time, the experience of these countries shows that the business community - for its own good - should take an interest and participate in the design and execution of human

resource development measures. Fairly advanced technologies are beginning to make an impact on the large-scale textile industry in Indonesia and Thailand, and the 1990s will no doubt see their rapid diffusion. At the same time, changing forms of organization and international market conditions require a new range of non-technical skills. Coping with these developments means investing in human resource development now.

The experience of Japan and the NIEs demonstrates the importance of a universal primary education and widespread secondary school attendance as an essential building block in the process of industrial skill development. As the complexity and speed of technological changes increase, formal education has to be complemented by specialized training and R&D more closely related to the production system. In-service training thus becomes an important vehicle for skill development and adaptation to the changing technology environment in the higher stage of industrial development. Major efforts will be needed to upgrade the present learning-by-doing type of training, which is limited in duration and scope and of highly variable quality. In-house training should be formalized and be part of a long-term overall personnel management plan. Refresher courses will have to be an integral part of training, to keep abreast of changes in technology, fashions, market conditions, etc.

There is little information concerning women's participation in the process of industrial skill development. It may however be assumed that they are severely underrepresented both in the relevant types of post-primary education and in-house training. In Bangladesh, there is even a very serious backlog in primary education. Secondary school is generally seen as the minimum requirement for managerial posts, and vocational technical training for the technical posts. On-the-job training and special upgrading courses are essential and can compensate for the lack of formal education, but only up to the level of a one line production supervisor. Production posts above that level and managerial posts are filled by direct recruitment. If women are to make a greater contribution to future growth in the textile and garments sector, then their access to education and specialized - technical and non-technical - training must be improved. The increasing importance of non-technical skills could be to the advantage of women - the textile and garment industry will in the future be characterized by a large number of jobs which are not necessarily the traditional preserve of men.

Social environment

The three country surveys have highlighted the importance of a social environment conducive to the enhancement of women's economic status. Gender bias institutionalized in traditional social norms, legal frameworks and recruitment practices affect both sides of the supply and demand equation for the female labour force. Evidence especially from Bangladesh and Indonesia has shown how a male-dominant culture can be an obstacle to a fuller integration of women in the industrial labour force and to social equity.

However, in situations where choices for economic survival are limited, the purely economic necessity for women to contribute to the family income or to work for their own existence takes precedence over cultural and religious values. Although Bangladesh and Indonesia are both predominantly muslim societies, low household incomes, especially in Bangladesh, have forced an increasing number of women to look for employment in manufacturing.

An aspect of gender bias which is harder to overcome is the perception of women's inability to carry out certain tasks associated with a higher degree of skills and responsibility. This is shown, for example, by the different attitudes among garment producers in Dhaka and

the Bangladesh EPZ with regard to training and certain types of female employment. Korean garment firms in the EPZ even send Bangladeshi female employees for training abroad. The evidence of the cross-cultural impact on attitudes and the practice of foreign enterprises coming from NIEs can serve as a vehicle of change in the perception of women as industrial workers. Many efforts will however be required to improve the access of women to higher-level employment, even in the most advanced countries, such as Japan. On the other hand, the example of Indonesia shows that there is some scope for women to make careers in industries where women have traditionally played a key role.

Legislation related to work conditions should also take better account of female participation in the industrial labour force. There is often a social justification for the protectionist type of regulations specifying work 'appropriate' for women and limiting female working hours. But where they distort equal access to job opportunities, diminish women's career opportunities and make female labour too expensive they should be changed.

CHAPTER 8
RESPONSES TO THE CHALLENGES

This section outlines areas of potential technical assistance relevant to the issues discussed in the previous chapter. It also includes some concrete proposals which were discussed during two follow-up seminars and coincidental field missions to Thailand and Bangladesh in October 1991. In view of the study's main objective, i.e. to avert the potential danger of marginalization of female labour in the process of technology changes in the textile and garment industry, four broad areas of assistance possibly rendered by UNIDO and/or other international organizations appear most relevant: industrial planning and policy advice, technology, human resources development, and social environment. Although some of the suggestions are not textile and garment industry specific, they are relevant in the broader context of industrial development of which the two industrial branches are an integral part.

8.1 Industrial planning and policy advice

8.1.1 Quantitative and qualitative information

Reliable industrial statistics and information on global and regional trends are important to provide a context and reference point for the formulation of national industrial policies. United Nations agencies are in the position to provide a valuable contribution by collecting and disseminating relevant information on general and sector-specific industry, technology and market trends at the global, regional and national level. So far this information base has conspicuously lacked data related to the development of human resources in general and industrial skills in particular. The emerging concern about 'human centred development' is a positive sign but the new concept needs to be translated into an operational and on-going framework of assessment. One of the major problems in analyzing the technology impact on women in the present study was the lack of gender specific and consistent data.

The identification of skill requirements associated with the present and expected use of technologies in individual industries should form an integral part of all industrial planning. In this context it is essential that gender differentiated indicators at the industrial sector and branch level should be integrated in the data base.

8.1.2 Policy advice

Direct advice on the elaboration of industrial policies is another area of potential technical assistance. The female industrial labour force, particularly in textiles and garments, has played a key role in industrial development. There is a large potential for further increases in women's contribution - in ways that also increase their benefits from development. UNIDO's experience in including experts on women in industry in technical assistance teams has proved highly relevant in this respect and should become a part of general practice, not only in UNIDO.

Industrial policy formulation should include measures which help to remove constraints inhibiting women from contributing to and benefiting from industrial development. This is especially important when dealing with sectors and branches with high female participation.

8.1.3 Strengthening national decision making and implementing capacity

A third area of potential technical assistance is in building up the local competence to implement and to ensure continuity of the proposed policies. The institutionalization of women's concerns will in most cases have to take place from the policy level down to the factory level. An inter-ministerial co-ordinating committee dealing with women in industry issues as an integral part of coordinating activities on human resource development for industry could be a starting point for this process.

Officers in the relevant ministries, such as planning, industry, labour, education, women affairs, and their respective extension staff in the field should be aware of problems of the female industrial labour force and be able to implement remedial measures.

8.2 Technology

8.2.1 Advice on the choice of technology

Not all technology innovations in the textile and garment sector originating from the developed countries may be appropriate, necessary in the immediate future, and/or economically viable for the three countries. There may be other ways to maintain their competitiveness in certain products and markets. Technical assistance could help the private and public sector in making a critical selection of appropriate components of new technologies which are suited to a country's conditions and its short- and long-term development strategy. Assistance may also be required in making the decisions operational. There are already examples of information/practical guidelines developed by specialized UN agencies for the assessment of appropriate technology both at the national policy level and at the programme/project level. ILO's "Manual on the assessment of appropriate national technology policies" and UNIDO's "Manual for the preparation of industrial feasibility studies" are examples of technical assistance in this field.

Providing advice on the speed and type of possible incremental technological changes as well as assessing/developing appropriate technologies which take advantage of rather than discriminate against female workers could not only positively influence the demand for female industrial labour but also a country's overall competitiveness in the textile and garments sector.

Joint ventures and/or private foreign investment could provide a useful vehicle for technology and skill transfer. The experience shows that the interest/incentives for foreign investors in developing local technological capacities has so far been limited. Information on potential investors, such as exists in UNIDO, could include an evaluation of the investors' past experience in technology/skill transfer.

The development of negotiating skills of potential local recipients may enhance, among other things, their ability to exercise a greater influence on the technology and skill components of an investment package and increase the awareness about technologies appropriate to women users.

8.2.2 Advice on organizational aspects of production

Raising producers' awareness of the potential benefits which could be derived from industry-related services in improving their market position, and providing advice on how to organize such services, could fall within the area of technical assistance. The Benetton clothing company offers an example of an innovative approach to this type of services: the company's competitiveness has been enhanced by the adoption of a decentralized production structure based on a large number of female sub-contractors coordinated and serviced by a main factory/centre. The new strategy adopted by Hong Kong to be a service centre or clearing house for buyers and suppliers in South East Asia provides an example of an externalized approach to the provision of services at a country and regional level.

These services raise the value added of a product and are a valuable non-price factor in competition. At present there is little producers' interest in and demand for such services in the three countries under survey, because production is highly dependent on specified orders from overseas buyers who are also suppliers of services such as design, pattern making and marketing. The other reason is the lack of skills needed to perform these services. To enhance endogenous development however, these services should be built up.

Assessment of the present and expected supply and demand of industrial services for the textile and garment sector should include an assessment of relevant skill requirements. Gender disparities which may have implications for gender specific educational and training strategies should be taken into account. This is important in view of the experience of the NIE's where an increasing number of women are entering the service sector as an alternative source of employment.

8.3 Human resources development

Human resources development covers interrelated demographic, social and economic aspects many of which fall outside the scope of this study. The main concern here is the development of skills relevant to industrial development in general and the textile and garment sector in particular, both in the short and longer term. Although the three countries under review differ in the level of the industrial skills attained, which may influence the choice of strategy in the short term, the prospective longer term changes have similar implications for the type of skills needed. In addition there are also similarities of constraints common to the female industrial labour force across the three countries.

8.3.1 Country-specific proposals

The generally much lower standard of basic education achieved until now in Bangladesh, particularly for women, is one of the biggest stumbling blocks for skill formation in the future. Improving primary school attendance of females and making adult literacy classes available and accessible to women both at the work place and outside should be of immediate concern. The involvement of USAID in secondary school scholarships to female students in Bangladesh is one example of a selective approach to counterbalancing the even greater inequalities of opportunities at the next educational level.

The lack of basic education seriously limits skills improvement and occupational advancement and is used as an excuse for automatic exclusion from any specialized in-service training. The absence of reading skills for example was a common reason quoted by production management in the EPZ why female machine operators could not be trained to perform the

setting of simple electronic attachments themselves. The problems could be partly solved by simplifying the presentation of instructions. Examples of instructions using drawings and symbols are common, for example on washing instruction labels, in furniture assembly etc. Such instructions could also be designed for basic maintenance of sewing machines. Technical assistance could be used in adapting instruction handbooks for simple tasks to the needs of particular users, in this case semi-illiterate women.

The absence of interest in training issues among many producers means that government and donor agencies may have to be involved to ensure the building-up of human capital. A number of garment producers in the EPZ can see the potential advantage in establishing a joint training centre at the EPZ premises. The question is how to go about it and what is it going to cost. Technical assistance could help to devise an operational framework appropriate to the present and expected skill needs; estimate and if necessary provide the start up capital for a joint training centre; and suggest a cost sharing arrangement for running expenses.

While the government and the business community should play a leading role, the role of private initiative of individuals should not be underestimated. The fact, for example, that female garment workers in Dhaka attend relatively expensive private courses in basic sewing skills demonstrates that the returns in terms of higher wages and/or in advancement on the job are perceived as worth while. Technical assistance in providing basic training in sewing skills could also be made accessible to women with limited financial resources.

Thailand and Indonesia, being industrially more developed than Bangladesh, face slightly different problems. In Thailand, one of the reasons for increases in wages, especially of skilled workers, is the emerging gap between supply of and demand for relevant skills. There is a real danger that if nothing is done soon this gap will increase with the transition to the next stage of industrial development. This shortage of skills for the next stage is felt in Indonesia as well. The country does have a basic structure for formal training in textile/garment relevant skills at various levels, but it needs to be much improved to serve the future needs of the industries.

The experience of international agencies could make a valuable contribution in the areas of vocational training, in-service training, industrial traineeships, and institution building.[130]

> *In-service and vocational training courses attuned to present and expected future skill requirements need to be established with the involvement of industry, government agencies, private training institutions and trade unions. International agencies should exert pressure to ensure equal training and advancement opportunities for both male and female workers.*

Looking further ahead, computer-aided technologies will eventually also affect the textile and garment sector in the developing countries, including the three countries under survey. Higher-level formal education in technical, management and marketing issues as well as R&D will become increasingly important.

A concrete proposal for higher studies for the textile and garments industry was presented during a seminar organized by UNIDO and the Thammasat University in Bangkok in October 1991. The proposal is founded on an interdisciplinary approach combining technology (engineering), art (design) and business elements (management and marketing). This would help to provide the flexible, multi-skilled workforce required by the new technology and market

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[130] UNIDO has recently submitted a project on "Technical and Managerial Skills Development for Women in the Garment Making Industry in Four Countries in the ASEAN region" for donor funding

conditions. The university and the business community would co-operate closely in devising the curriculum, providing short-term traineeships during the study period, and share the cost of establishing and running the programme. The proposal also includes measures to attract women as students; these would again provide technical assistance to female textile home workers through supervised practical field assignments. It is envisaged that graduates from the course will find employment not only in the textile and garment branch but also in industry related services.

Projects dealing with the development of human resources for industry have to be based upon the full participation of the academic and business community, as well as of organizations dealing with women's issues in all stages of a project cycle.

The long-term strategy has to focus on encouraging women to take more technically and business-oriented courses to break the persistence of stereotypes and prejudices perpetuated by the present gender-biased educational systems. Technical assistance in counselling at school and workplace, in the active use of media, and in the provision of relevant publicity material would contribute to changing the public's image about the role of women, and would encourage women to seek careers in technical and business fields.

8.3.2 Additional research/studies

The experience of women in the NIEs should be used to gain a long-term perspective on women's potential role in the broad context of industrial restructuring which will sooner or later affect the three countries. The example of women who have successfully made inroads into non-traditional forms of employment with better wages and working conditions can help to answer the question of how to absorb low-skilled women workers in higher skill categories. Analyses of the changing structure of employment in the NIEs could be useful in preparing guidelines for training and retraining, facilitating the improvement of women's skill levels. The experience of the NIEs would also be useful when formulating government policies with regard to public intervention in the labour market. A study of the progress made and ways used by the NIEs to increase the range and level of skills of their labour force can provide a useful lesson for the formulation of gender-specific labour market policies and training programmes.[131]

8.4 The social environment

The importance of a social environment conducive to enhancing the equal participation of women in the industrial labour force has been documented in this study. A variety of social and religious values exert pressure, in different degrees, on women not to take up work outside the household, but they are eroded by the basic need for survival. Available statistics indicate an increasing trend in female-headed households, single mothers, widows and unmarried women. With changing social norms, legislation based on these norms will have to be modified to reflect women's specific, changing needs. Although almost two development decade dedicated to the improvement of women's social and economic status have now passed, the need is still there for international agencies to assist in creating a more enabling environment for women by sensitization and suggestions for amended legal structures at national and international levels.

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[131] A useful study done in this respect is by Bernard Salome and Jacques Charmes "In service Training Five Asian Experiences", Development Centre Studies, OECD, 1988. However, this study does not provide specific information concerning the female labour force. A forthcoming joint study by ESCAP/UNDP/ARTEP on "Diversified Skill Development for Women in Industry", including a comprehensive survey on employment and occupational mobility in urban labour markets in four Asian countries may shed more light on the subject.

There is also evidence that welfare measures targeting women are not enough to improve women's social and economic status.[12] Many regulations supposedly intended for female labour protection have not served the purpose and in many instances have been used to discriminate against women. As long as the cost of social services provided for women is borne either by them alone and/or partly transferred on to an employer, female labour will face a cost disadvantage on the labour market. Efforts should be made to devise better welfare cost-sharing approaches as well as social measures allowing women and men to be equal partners at work and at home.

There is a need for a new integrated approach which calls for action not only on factors determining the quality of the female labour supply but simultaneously helps to remove constraints on the effective demand for female labour.

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[12] See for example ESCAP study on "Achievements of the United Nations Decade for Women in Asia and the Pacific", 1988

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