OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as "developed", "industrialized" and "developing" are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

17055

THE ROLE OF WOMEN IN INDUSTRIAL DEVELOPMENT

A Report prepared for UNIDO

by

Swasti Mitter

Department of Business Management

Brighton Polytechnic

Brighton, UK

Corrected Version

INDEX

CHAPTER 1

1.0 WOMEN'S PARTICIPATION IN INDUSTRIAL DEVELOPMENT

1.1 Women's Contribution: A Global View

In 1985, the number of women workers in the industrial sector of the world stood well above 166 million and was still showing an upward trend.[1] Of these women, more than half were in the developing countries. The emergence of women as a major industrial workforce, particularly in the UN Decade for Women, understandably brought contradictory responses from the researchers as well as from the policy makers. In many ways, there were disturbing aspects in this new trend. The majority of women workers in industry were observed to be employed in occupations that were ill-paid, repetitive and with poor career structures.[2] Moreover, a vast number of women found employment precisely in the areas that are vulnerable to threats of automation. Only a narrow range of industries, such as electronics, food-processing and textiles, sought and recruited women workers for unskilled and semi-skilled work. These jobs required little training and hence could rely upon a workforce that has the image of being prone to a high turnover.

The share of women in management and other highly skilled occupations remained perceptibly insignificant.[3] And yet, the rise of the new female industrial workforce also indicated a positive aspect in this period. In many countries, even exploitative jobs offered the very opportunity that women needed to make an entry into the world of paid work. Their new status gave them the bargaining power they needed to demand greater entitlement to resources within their own families and in society at large.[4]

In many developing countries, the newly found economic independence of a sizeable number of women workers in the industrial sector brought a new momentum in social change: a change that opens the possibility of a far-reaching programme for the empowerment of women. However, the realisation of such a programme will necessarily depend, to a very large extent, on the availability of resources for training women in skills for more varied and rewarding occupations. These are the very skills that are also needed for a self-sustainable development in the current phase of industrial restructuring. In this context, the issue of human resource development assumes an urgent importance.

The major thrust of research in the eighties in the field of women and development has been to highlight that women contribute a significant proportion of the labour not only in the agricultural but also in the industrial sector of the majority of countries.[5] Women do so most obviously by joining in ever-increasing numbers the rank of workers in the organised sector of factory production. But they also contribute as invisible, hidden or unregistered workers in the so called 'informal' sector of the economy. Contrary to common assumptions, the output of the informal sector is not simply for the family and for the subsistence economy. As the results of recent research undertaken by women scholars from different regions of the world have increasingly revealed, women's work in the informal sector provides vital labour for the international as well as the national market economy.[6] In this often ill-defined sector, women play, at least numerically, far more important a role than men.

It is intrinsically difficult to estimate the exact number of women engaged in manufacturing activities of the informal sector; but a number of important studies, cited later in this report, indicate that the informal

workforce is on the rise. The published figures relating to women workers in the manufacturing sector, therefore, should be accepted if anything as an underestimate of the actual numbers engaged.

Even with this bias towards underestimation, the 1984 World Survey on the Role of Women in Development already documented a growing female participation in the manufacturing sector of the developing countries between 1960 and 1980. The observed trend has become ever more pronounced in the eighties. For identifying the recent changes, the current, often incomplete, country-based statistics have been used for this report. This is because the global employment figures, with their sectoral and industrial breakdown, are, at the moment, not available beyond 1980.

In Africa the share of manufacturing in total employment remained generally lower than that of industrialising countries of South East Asia, yet there were some changes discernible from the available evidence. (Table 1) Mauritius, for example, has experienced a rapid growth in industrial employment, which was made possible precisely because of the entry of women into the manufacturing sector. In Egypt, the overall share of manufacturing employment has remained constant between 1980 and 1985, yet the participation of women in manufacturing employment has increased dramatically. Women also have made steady progress in manufacturing employment in Latin American and the Caribbean countries. The exception to the general trend is in Barbados.

In contrast, women's employment opportunities in some of the Asian NIC countries have shown a sign of stagnation partly because of the declining scope of export-led growth in the recent phase of world structuring. The experiences of the developed countries, as the figures in Table 1 indicate, have been somewhat different. In the United States, the Federal Republic

Table 1: Manufacturing in Total Employment and Women's share in manufacturing in the early and mid-1980s.

Country and Region		Total Employed (thousands)	Share of Manufacturing in Total Employment	Share of Women in Total Manufacturing
AFRICA:				
Botswana	1980	84.41	6.6%	16.1%
	1985	117.2	8.6%	26.7%
Egypt	1980	9791.1	14.7%	5.2%
	1985	11526	14.7%	15.0%
Kenya	1980	1005.8	14.0%	9.3%
	1985	1174.4	13.5%	9.9%
Mauritius	1980	197.561	18.4%	56.1%
	1985	215.354	29.2%	62.0%
AMERICA:				
Barbados	1980	99.3	15.2%	58.9%
	1985	92.1	13.0%	54.2%
Bermuda	1980	29.669	3.6%	34.7%
	1985	32.19	3.6%	35.2%
Costa Rica	1980	724.71	16.3%	29.6%
	1985	826.79	15.9%	31.8%
Cuba	1980	2606.6	21.7%	25.7%
	1985	3163.6	22.0%	30.7%
Puerto Rico	1980	760	18.6%	46.1%
	1985	758	17.9%	46.3%
United States	1980	99303	22.1%	31.5%
	1985	107150	19.5%	32.3%
ASIA				
Cyprus	1980	200.1	19.9%	46.1%
	1984	220.4	20.0%	45.6%
Hong Kong	1980	2237.8	42.1%	45.3%
	1985	2543.3	36.1%	46.5%

Country and Region		Total Employed (thousands)	Share of Manufacturing in Total Employment	Share of Women in Total Manufacturing
India				
	1980	22305	26.3%	9.6%
	1984	24142	25.6%	9.5%
Japan				
	1980	55360	24.7%	38.6%
	1985	58070	25.0%	39.5%
Korea, Rep. of				
	1980	13706	21.7%	39.3%
	1985	14935	23.4%	38.7%
Philippines				
	1980	17154	10.8%	47.1%
	1985	20327	9.5%	48.7%
Singapore				
	1980	1068.9	29.2%	46.0%
	1985	1154.3	25.5%	44.3%
Sri Lanka				
	1980	1078.4	16.7%	31.0%
	1984	956.5	20.8%	37.8%
EUROPE:				
Czechoslovakia				
	1980	7358	34.5%	43.2%
	1985	7606	34.0%	43.0%
Germany, Fed Rep.				
	1980	25797	34.3%	29.6%
	1985	25000	32.0%	29.3%
Yugoslavia				
	1980	5682	36.4%	36.1%
	1985	6378	37.8%	38.0%
United Kingdom	1980	24984	28.4%	29.1%
	1985	24071	23.8%	28.2%

(1) Manufacturing includes all activities under Major Division 3 of International Standard Industries Classification (ISIC - 1968)
(2) Employment is defined as in the Thirteenth International Conference of Labour Statistics, Geneva, 1982
Source: ILO Yearbook of Labour Statistics 1986

of Germany and the United Kingdom, women lost out in the manufacturing sector in terms of the total number employed, but increased or more or less maintained their overall share. The figures imply that the rate of displacement was generally higher for men than for women in the manufacturing sector for rich countries in this period. The only exception being Japan where women gained numerically as well as in their share of jobs in manufacturing. This can be attributed to the growth of part-time work in that sector in Japan. The evidence from Yugoslavia shows the increased importance of women in this sector of the Centrally Planned Economies.

Table 2 documents women's share of employment in major industry groupings in selected countries. The statistics indicate that the main sources of employment for women in most countries are in the following industries: food manufacturing, textile and clothing, chemical products, printing and publishing, and electrical apparatus that include electronics. Understandably, there are inter-country variations in the importance of these industries. In Cuba and in the . Republic of Korea, for example, wood and cork products are an important source of employment for women. In Czechoslovakia, again women's representation in iron and steel industries is substantial - a phenomenon not so common in other economies, except in Sri Lanka, the Federal Republic of Germany and in another socialist country, Cuba. In Sri Lanka and Mauritius, the two latecomers to the export-led model of growth, women's participation in the clothing industry has been spectacular.

1.2 Women in Manufacturing Employment: Quality of Working Life

It is important here to evaluate women's gain in terms of improved quality of working life that they may have achieved during this period. Hours of

Table 2: Women's share of employment in major industry groupings in selected countries. (numbers and percentages)

(See attached the definitions of industries according to ISIC - 1968 for Manufacturing)

Country	Year	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.
Broad ISIC		31		32				33		34		35		36		37		38	
AFRICA:																			
ISIC:		(311-312)		(321)				(33)		(34)		(35)				(37)		(38)	
Botswana	1981	2436	4.0	1075	56.0			368	5.4	134	30.0	149	24.8	-	-	-	-	454	8.6
	1983	2510	14.2	1678	60.0			321	6.9	500	25.8	426	8.5	-	-	-	-	1812	5.4
	1985	3238	15.8	1549	69.0			389	11.8	521	31.0	301	18.6	-	-	-	-	1999	16.0
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(355)		(369)		(371)		(384)	
Kenya	1981	34740	18.4	21850	12.4	6690	23.9	8920	7.8	4450	11.2	1790	5.6	4530	4.4	4530	2.2	1710	11.7
	1983	35980	13.1	21510	9.8	6810	22.0	8650	6.9	4810	12.5	1820	5.5	4290	4.7	4290	2.3	1950	-
	1985	41510	-	22820	-	7680	-	7850	-	5190	-	1940	-	4890	-	4890	-	2230	-
ISIC:		(311-312)		(321)		(322)		(33)		(342)		(351-354)		(36)		(371)		(381)	
Mauritius	1981	2680	26.5	2109	51.6	19353	87.0	1000	13.1	1105	19.0	1048	21.0	1388.0	6.6	359.0	1.1	455.0	22.0
	1983	2854	25.3	2304	49.0	19677	87.0	1154	14.8	1086	19.6	1118	19.9	1222	6.9	368	5.7	557	24.8
	1985	3128	27.5	2678	42.1	42393	77.0	1218	15.2	1002	21.8	1142	19.4	1206	7.1	327	5.5	551	24.3
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(384)	
Zimbabwe	1981	24800	7.2	18800	9.0	16800	20.0	6800	2.9	5600	10.7	4700	8.5	6900	1.4	15500	1.3	5200	7.7
	1983	27400	7.3	20000	7.0	16000	19.0	5100	2.0	5800	12.1	4900	8.2	6700	3.0	12800	2.3	5500	5.5
	1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AMERICA:																			
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(384)	
Colombia	1981	73440	28.0	64370	33.6	50040	81.0	5700	12.3	20200	30.9	23710	41.7	20820	7.3	14300	7.1	14000	14.4
	1983	75900	30.3	52800	35.3	45980	81.0	6040	12.3	19620	30.8	23190	42.2	21220	7.8	12890	6.8	15880	27.6
	1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISIC:		(311-312)		(321)		(322)		(33)		(342)		(352)		(36)		(371)		(384)	
Cuba	1981	198600	17.1	19000	44.2	28700	80.0	17700	28.2	11500	27.0	-		3200	31.3	8000	15.0	1600	29.4
	1983	246400	20.7	22500	51.5	29500	84.0	15200	34.9	8600	37.2	-		5800	34.4	8800	17.0	14000	11.8
	1985	263200	21.0	28400	42.6	31700	84.0	15600	34.6	10400	38.5	19000	43.7	6700	35.8	6700	19.4	14600	15.6

Country	Year	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.	Tot.	% of fem.
Broad ISIC		31		32				33		34		35		36		37		38	
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)			
United States	1981	1438000	32.0	823000	47.5	1244000	81.0	666000	15.2	1266000	40.0	503000	35.6	456000	15.0	707000	8.3	2094000	42.6
	1983	1392000	32.7	741000	47.6	1163000	81.0	657000	14.8	1299000	40.9	492000	36.0	412000	14.8	480000	8.3	2011000	42.2
	1985	1392000	32.8	704000	47.9	1125000	80.0	700000	15.3	1435000	42.2	512000	36.5	447000	15.4	448000	9.0	2207000	41.9
ASIA:																			
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(383)	
Hong Kong	1981	17270	21.8	122620	49.4	259710	68.0	6960	16.5	28510	18.8	5920	39.4	2150	7.9	3060	7.2	424810	62.8
	1983	16370	23.6	111140	46.8	268940	69.0	5740	14.8	27360	20.7	5860	36.5	2600	6.2	1590	6.3	431570	62.8
	1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(351-352)		(369)		(371)		(383)	
India	1981	607000	28.2	1831000	7.3	37000	24.0	46000	10.9	159000	3.1	482000	9.3	201000	10.0	427000	3.3	346000	7.2
	1983	677000	23.3	1823000	7.1	42000	33.0	44000	9.1	164000	3.7	518000	10.4	205000	9.3	424000	3.5	361000	7.8
	1985	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(383)	
Korea, Rep. of	1981	121500	41.2	386800	69.4	215100	78.0	43800	27.6	45700	26.0	49200	38.4	49900	18.0	67700	5.9	208500	56.4
	1983	140300	41.3	377900	65.6	226300	74.0	40000	25.3	54400	25.7	55900	37.0	67100	14.8	75200	6.3	284400	47.0
	1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(383)	
Sri Lanka	1981	35570	28.9	36760	54.8	21890	90.0	5010	5.2	6510	6.8	5730	18.0	12320	11.9	430	16.3	3210	21.5
	1983	33350	29.9	30770	48.1	20140	90.0	6240	3.2	7130	5.3	5750	19.0	9710	10.8	150	26.7	1080	15.6
	1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EUROPE:																			
ISIC:		(311-312)		(321)		(322)		(331)		(342)		(352)		(369)		(371)		(383)	
Czechoslo-vakia	1981	129600	50.0	176100	69.1	87700	84.0	52700	39.1	23300	48.0	16400	57.3	65700	23.4	119300	22.3	104400	52.8
	1983	130100	49.8	171500	69.2	86200	84.0	51700	38.9	22400	48.6	15900	56.0	64900	23.1	118700	22.7	104000	51.8
	1985	131200	49.6	171200	69.3	85300	84.0	50600	38.1	21000	49.0	16300	55.8	63800	23.0	124900	23.2	110500	51.0
ISIC:		(31)		(32)				(33)		(34)		(35)		(36)		(37)		(38)	
Germany, F.R. of	1981	766000	41.5	722000	66.3			481000	20.2	481000	38.7	956000	28.0	292000	24.5	693000	17.5	373000	23.0
	1983	717000	42.5	633000	67.7			448000	20.8	465000	37.4	878000	27.7	268000	24.3	543000	17.8	3588000	22.7
	1985	717000	42.5	633000	67.7			448000	20.8	470000	37.7	878000	27.7	268000	24.3	543000	17.8	3591000	22.7

Notes: The sectors and subsectors were selected on the grounds of a) the availability and consistency of data, b) their importance in the total economy, and c) their significance for women's employment.

Source: ILO Yearbook of Labour Statistics 1986

INTERNATIONAL STANDARD INDUSTRIAL CLASSIFICATION OF ALL ECONOMICS ACTIVITIES (ISIC - 1968)

Division 3 - Manufacturing

31		Manufacture of Food. Beverages and Tobacco
	311-312	Food manufacturing
	313	Beverage industries
	314	Tobacco manufactures
32		Textile. Wearing Apparel and Leather Industries
	321	Manufacture of textiles
	322	Manufacture of wearing apparel. except footwear
	323	Manufacture of leather and products of leather. leather substitutes and fur. except footwear and wearing apparel
	324	Manufacture of footwear. except vulcanized or moulded rubber or plastic footwear
33		Manufacture of Wood and Wood Products. Including Furniture
	331	Manufacture of wood and wood and cork products. except furniture
	332	Manufacture of furniture and fixtures. except primarily of metal
34		Manufacture of Paper and Paper Products. Printing and Publishing
	341	Manufacture of paper and paper products
	342	Printing. publishing and allied industries
35		Manufacture of Chemicals and Chemical. Petroleum. Coal. Rubber and Plastic Products
	351	Manufacture of industrial chemicals
	352	Manufacture of other chemical products
	353	Petroleum refineries
	354	Manufacture of miscellaneous products of petroleum and coal
	355	Manufacture of rubber products
	356	Manufacture of plastic products not elsewhere classified
36		Manufacture of Non-Metallic Mineral Products. except Products of Petroleum and Coal
	361	Manufacture of pottery. china and earthenware
	362	Manufacture of glass and glass products
	369	Manufacture of other non-metallic mineral products
37		Basic Metal Industries
	371	Iron and steel basic industries
	372	Non-ferrous metal basic industries
38		Manufacture of Fabricated Metal Products. Machinery and Equipment
	381	Manufacture of fabricated metal products. except machinery and equipment
	382	Manufacture of machinery except electrical
	383	Manufacture of electrical machinery apparatus. appliances and supplies
	384	Manufacture of transport equipment
	385	Manufacture of professional and scientific and measuring and controlling equipment not elsewhere classified. and of photographic and optical goods
39	390	Other Manufacturing Industries

work per worker in the manufacturing sector are one such indicator of the gain or losses made by women in the world of paid work in industries. Table 3 reveals that there has not been any perceptible fall in the number of hours worked by women in the eighties. In the Republic of Korea, the average hours of work have, in fact, increased over the period between 1981 and 1985. Women's weekly inputs of labour, as Table 3 indicates, are consistently lower than those of men in most countries. However, the figures inevitably do not include the workload women carry, in conjunction with that in the domain of paid work, in domestic duties and other unpaid labour. The male share in the sphere of unpaid work is still small.

A comparison of wage rates and earnings for male and female workers can also reveal women's progress in the area of industrial work. The available, albeit incomplete, statistics show that in some countries women have made some progress in this direction. (Table 4) The record of Asian NICs for example is optimistic whereas that of Sri Lanka is not good. However, the general picture remains unaltered in that in both the developed and developing countries, women on average earn far less than men. The Tanzanian experience in the early eighties is an exception to the general rule. This is because female participation in the modern industrial sector has tended so far to be concentrated in the low-wage, low-skill jobs; it is rare to find women at the higher technical and managerial levels.

Table 5 shows that between the early and the mid-eighties, women have increased their share in the administrative and managerial workforce in all countries. This is a positive gain; yet the proportion of women in these coveted jobs is still rather insignificant. This is because everywhere women are mostly concentrated in the bottom layer of the career pyramid - working as direct operatives on low pay.

Table 3: Hours of work by male and female workers in the manufacturing sector in the 1980s.

Country		1981	1982	1983	1984	1985
Burma						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	7.5	7.5	7.6	-	-
Costa Rica						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	48.5	48.0	49.3	42.5	43.0
Cuba						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	42.2	41.8	43.1	43.2	43.4
Czechoslovakia						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	43.3	43.1	43.1	43.0	43.1
Cyprus (c)						
	M	42.0	42.0	42.0	42.0	42.0
	F	40.0	40.0	40.0	40.0	40.0
	T	41.0	41.0	41.0	41.0	41.0
El Salvador						
	M	44.5	44.2	44.0	44.0	44.0
	F	44.1	44.1	44.0	44.0	44.0
	T					
Germany, (FR)						
	M	41.6	41.1	40.8	41.4	41.1
	F	39.4	39.1	39.1	39.7	39.5
	T	41.1	40.7	40.5	41.0	40.7
Gibralter						
	M	48.1	49.0	49.2	51.9	48.8
	F	41.1	41.4	43.7	42.0	41.2
	T	46.9	47.7	47.6	50.4	48.7
Greece (c)						
	M	40.9	39.6	39.2	39.0	40.0
	F	37.7	37.2	37.7	37.2	38.3
	T	39.5	38.6	38.5	38.2	39.3
Hong Kong						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	46.2	45.2	45.5	44.8	44.8
Israel						
	M	40.1	39.0	38.9	39.3	39.7
	F	35.1	34.9	35.0	35.4	35.3
	T	39.0	38.1	38.0	38.5	38.6

Country		1981	1982	1983	1984	1985
Japan						
	M	42.1	42.1	42.3	43.0	42.9
	F	38.3	38.3	38.6	38.8	38.2
	T	41.0	40.9	41.1	41.7	41.5
Rep. Korea						
	M	53.4	53.6	53.9	54.0	53.5
	F	53.9	54.0	55.0	54.8	54.2
	T	53.7	53.7	54.4	54.3	53.8
Panama						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	45.5	-	46.1	-	-
Puerto Rico						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	38.2	37.5	38.7	38.7	38.4
Singapore						
	M	51.9	50.5	50.6	50.7	53.6
	F	46.2	46.4	47.5	46.9	42.4
	T	48.7	48.3	48.9	48.6	47.4
Sri Lanka [a]						
	M	53.6	48.2	49.6	49.9	53.6
	F	47.7	40.1	45.4	44.3	42.4
	T	52.6	46.5	48.9	48.6	47.4
United Kingdom	M	42.0	42.0	42.5	42.8	43.0
	F	37.5	37.8	38.1	38.1	38.1
	T	-	41.0	41.5	41.7	41.8
USSR						
	M	-	-	-	-	-
	F	-	-	-	-	-
	T	40.7	40.4	40.3	-	-
United States	M	-	-	-	-	-
	F	-	-	-	-	-
	T	39.8	38.9	40.1	40.7	40.5

Notes: a) Hours paid for. Remaining countries refer to hours worked.

Source: ILO Yearbook of Labour Statistics 1986

Table 4: Wage rates and earnings for male and female manufacturing workers in various countries, 1980,1984,1985.

Country	Currency	1980			1984			1985		
		M	F	Ratio of F/M	M	F	Ratio of F/M	M	F	Ratio of F/M
AFRICA:										
Egypt	E.pound(EG/w)	n/a	n/a		n/a	n/a		n/a	n/a	
Kenya	Shilling(EG/m	1279.3	810.6	63.4%	1879.3	1437.7	76.5%	n/a	n/a	
Tanzania	Shilling(EG/m	683.0	693.0	101.5%	n/a			n/a	n/a	
AMERICA:										
El Salvador	Colones(EG/h)	2.61	2.12	81.2%	3.31	2.77	83.7%	3.56	2.90	81.5%
ASIA:										
Hong Kong	Dollar(RT/d)	85.70*	66.60*	77.7%	104.20	84.40	81.0%	115.10	91.20	79.2%
Japan	Yen (EG/m)	295786	128995	43.6%	365561	152519	41.7%	367182	154571	42.1%
Republic of Korea	Won (EG/m)	196231	88456	45.1%	317273	149718	47.2%	346852	162705	46.9%
Singapore	Dollar (EG/h)	2.70	1.66	61.5%	4.11	2.66	64.7%	4.32	2.74	63.4%
Sri Lanka	Rupee (EG/d)	29.62	22.34	75.4%	39.91	26.84	67.3%	50.10	35.23	70.3%
EUROPE:										
Belgium	Franc (EG/h)	236.18	164.61	69.7%	299.66	223.25	74.5%	312.53	232.25	74.3%
France	Franc (EG/h)	24.40	18.78	77.0%	38.11	29.86	78.4%	40.20	31.78	79.1%
Fed. Rep. of Germany	Deutschmark (Eg/h)	14.09	10.25	72.7%	16.50	12.00	72.7%	17.24	12.54	72.7%
United Kingdom	Sterling (EG/h)	2.664	1.834	68.8%	3.677	2.529	68.8%	3.910	2.710	69.3%
OCEANIA:										
Australia	Dollars(EG/h)	6.7	5.76	86.0%	10.05	8.62	85.8%	10.46	9.12	87.2%
New Zealand	Dollars(EG/h)	5.69	4.39	77.2%	8.63	6.75	78.2%	9.38	7.24	77.2%

EG = earnings RT = rate /w = per week /m = per month /d = per day

* = 1982 figure

Source: ILO Yearbook of Labour Statistics 1986

Table 5: Women in administrative and managerial jobs in selected countries.

Country by region	Year	Administrators and managerial workers		
		Men and women (number) (thousands)	Women (number) (thousands)	Proportion of women
AFRICA:				
Egypt	1980	135.8	16.8	12.4%
	1983	235.8	38	16.1%
AMERICA:				
Barbados	1981	3.1	0.8	25.8%
	1985	3.8	1.1	28.9%
Canada	1981	892	244	27.4%
	1985	1293	417	32.3%
Chile	1980	67.6	10.5	15.5%
	1984	105.6	18.8	17.8%
Panama	1979	62.6	4.3	6.9%
	1985	64.6	6	9.3%
Puerto Rico	1981	84	16	19.0%
	1985	86	19	22.1%
United States	1980	11540	3168	27.5%
	1984	11571	3889	33.6%
Venezuela	1981	198.66	19.69	9.9%
	1985	208.93	28.25	13.5%
ASIA:				
Bahrain	1981	2.2	0.1	4.5%
	1982	5.2	0.3	5.8%
Hong Kong	1981	81.6	8.9	10.9%
	1985	86.5	10.8	12.5%
Indonesia	1978	47	1	2.1%
	1982	39	4	10.3%
Israel	1981	46.5	4.2	9.0%
	1985	73.1	9.2	12.6%
Japan	1981	2280	120	5.3%
	1985	2110	140	6.6%

Country by region	Year	Administrators and managerial workers		
		Men and women (number) (thousands)	Women (number) (thousands)	Proportion of women
Rep. of Korea	1981	205	4	2.0%
	1985	218	8	3.7%
Kuwait	0	0	0	-
	1981	3.231	0.065	2.0%
Singapore	1981	58.3	8.6	14.8%
	1985	65.9	13.1	19.9%
Sri Lanka	1980	14.1	1.4	9.9%
	1984	16.5	1.8	10.9%
Thailand	1980	294.6	52.4	17.8%
	1982	406.7	80.4	19.8%
EUROPE:				
Germany. Fed.Rep.	1980	792	131	16.5%
	1984	1022	214	20.9%
Greece	1981	73.7	7.6	10.3%
	1984	50.8	7.1	14.0%
Norway	1981	104	20	19.2%
	1985	132	29	22.0%
Portugal	1981	52	6	11.5%
	1985	52	7	13.5%
Spain	1981	173.4	4.7	2.7%
	1985	177.5	6.1	3.4%
Sweden	1980	98	16	16.3%
	1984	100	21	21.0%
OCEANIA:				
Australia	1981	399.8	57.9	14.5%
	1985	450.5	79.6	17.7%

Source: ILO Yearbook of Labour Statistics (1986)

The occupational distribution of women accounts in part for the much lower level of income of women than men in manufacturing and elsewhere. (Table 6) The Table 6 shows generally poor representation of women in the administrative and managerial occupations in all societies. The position of women in non-manual occupations excluding sales and service workers have, however, changed somewhat overall to women's advantage since 1980. Women still find jobs in clerical occupations; they are also visible in the category of professional and technical workers, where they generally provide low-paid yet vital services in the teaching and nursing professions. Yet the Table 6 shows that in most countries women are also advancing in the category of administrative and managerial jobs. The gap between the position of men and women, however, is still wide.

As production workers, women are recruited again mainly for unskilled or semi-skilled jobs. The industries that employ women justifiably acquire an image of a low-pay sector. The clothing industry typifies the situation. In the 23 countries surveyed by ILO, it was found to be one of the lowest paid sectors in manufacturing industry. Relatively low wages in any sector are invariably linked to its having a high proportion of female workers.[7]

1.3 Changing International Division of Labour

The disaggregated data by region, however, only partially reflect the major factors that have affected the structure of female employment from the 1960's onwards. It is in the context of a new international division of labour in this period that the issue of the female workforce came to the fore in the seventies. The growing debate about the desirability of the creation of a young female workforce has, since then, invariably become linked with another question: the rationale of the export-led model of development. One of the major driving forces behind the emergence of the

Table 12. Distribution of the male and female employment by occupation. (thousands and percentage)

Country by region	Year	Total	profes-sional, tecnhical and rela-ted workers	Adminis-trative and mana-gerial workers	Clerical and related workers	Sales workers	Service workers	Agricul-ture, forestry etc. workers	Produc-tion workers	workers not classif-iable occu-pation
AFRICA:										
Egypt	1980 M	9106	7.8%	1.3%	6.5%	6.9%	8.9%	44.3%	24.3%	0.0%
	1983 M	9581	9.2%	2.1%	7.2%	6.2%	8.8%	40.1%	26.3%	0.0%
	change:	5.2%	1.4%	0.8%	0.7%	-0.7%	-0.1%	-4.2%	2.0%	0.0%
	1980 F	692.8	40.6%	2.4%	28.2%	4.5%	7.9%	8.8%	7.5%	0.0%
	1983 F	1944	19.7%	2.0%	14.9%	7.7%	4.1%	40.8%	10.8%	0.0%
	change:	180.6%	-21.0%	-0.5%	-13.3%	3.2%	-3.7%	32.0%	3.3%	0.0%
AMERICA:										
Barbados	1981 M	57.4	11.0%	4.0%	8.4%	6.4%	11.8%	10.5%	47.9%	0.0%
	1985 M	52	8.7%	5.2%	11.5%	7.3%	15.8%	7.1%	44.4%	0.0%
	change:	-9.4%	-2.3%	1.2%	3.2%	0.9%	3.9%	-3.3%	-3.5%	0.0%
	1981 F	42.8	11.9%	1.9%	20.8%	12.1%	25.0%	8.2%	20.1%	0.0%
	1985 F	40.1	11.2%	2.7%	25.2%	11.2%	27.2%	6.5%	16.0%	0.0%
	change:	-6.3%	-0.7%	0.9%	4.4%	-0.9%	2.2%	-1.7%	-4.1%	0.0%
Canada	1981 M	6559	13.1%	9.9%	6.4%	10.4%	10.1%	7.2%	42.8%	0.0%
	1985 M	6507	13.6%	13.5%	6.0%	9.2%	10.5%	8.1%	39.2%	0.0%
	change:	-0.8%	0.5%	3.6%	-0.4%	-1.2%	0.4%	0.8%	-3.6%	0.0%
	1981 F	4447	19.2%	5.5%	34.3%	10.1%	18.3%	2.8%	9.8%	0.0%
	1985 F	4804	20.6%	8.7%	31.7%	9.6%	18.3%	2.7%	8.5%	0.0%
	change:	8.0%	1.4%	3.2%	-2.6%	-0.5%	-0.1%	-0.1%	-1.4%	0.0%

Country by region	Year	Total	profes-sional, tecnhical and rela-ted workers	Adminis-trative and mana-gerial workers	Clerical and relat[illegible]d wo[illegible]s	Sales workers	Service workers	Agricul-ture, forestry etc. workers	Produc-tion workers	workers not classif-iable occu-pation
Chile	1980 M	2298	4.7%	2.5%	11.2%	11.5%	5.1%	22.4%	40.8%	1.8%
	1984 M	2343	4.6%	3.7%	9.5%	11.4%	5.0%	21.8%	42.4%	1.6%
	change:	2.0%	-0.1%	1.2%	-1.7%	-0.1%	0.0%	-0.6%	1.6%	-0.2%
	1980 F	959.3	13.2%	1.1%	18.8%	17.2%	30.3%	2.8%	16.3%	0.2%
	1984 F	1006	13.1%	1.9%	16.5%	16.3%	30.2%	2.9%	19.0%	0.1%
	change:	4.9%	-0.1%	0.8%	-2.4%	-0.9%	-0.2%	0.1%	2.7%	-0.1%
Panama	1982 M	399.1	7.4%	4.8%	4.6%	6.4%	10.2%	35.1%	31.1%	0.3%
	1985 M	444.4	7.0%	4.8%	4.7%	6.5%	9.2%	37.6%	30.1%	0.0%
	change:	11.4%	-0.4%	0.0%	0.1%	0.1%	-1.0%	2.6%	-1.1%	-0.2%
	1982 F	162	18.3%	3.1%	25.7%	9.3%	30.2%	3.9%	9.5%	0.1%
	1985 F	185.2	20.5%	3.2%	23.5%	10.8%	30.1%	2.7%	9.1%	0.0%
	change:	14.3%	2.2%	0.2%	-2.2%	1.5%	-0.1%	-1.2%	-0.4%	-0.1%
United States	1981 M	57397	15.9%	14.6%	6.3%	6.1%	8.9%	3.9%	44.3%	0.0%
	1985 M	59891	14.4%	13.1%	5.7%	11.0%	9.5%	4.9%	41.3%	0.0%
	change:	4.3%	-1.4%	-1.4%	-0.6%	4.9%	0.6%	0.9%	-3.0%	0.0%
	1981 F	43000	17.0%	7.4%	34.7%	6.8%	19.4%	1.1%	13.6%	0.0%
	1985 F	45915	17.4%	8.5%	29.1%	13.1%	18.7%	1.2%	12.0%	0.0%
	change:	6.8%	0.3%	1.1%	-5.6%	6.4%	-0.7%	0.1%	-1.6%	0.0%
Venezuela	1981 M	3466	6.1%	5.2%	7.3%	12.5%	8.1%	19.4%	40.8%	0.6%
	1985 M	3626	6.6%	5.0%	5.8%	13.5%	8.8%	21.4%	38.2%	0.6%
	change:	4.6%	0.5%	-0.2%	-1.5%	1.0%	0.7%	2.1%	-2.6%	0.0%
	1981 F	1289	19.8%	1.5%	23.0%	13.7%	28.0%	1.7%	12.2%	0.1%
	1985 F	1385	21.6%	2.0%	20.8%	14.2%	28.3%	1.7%	11.2%	0.1%
	change:	7.4%	1.8%	0.5%	-2.2%	0.5%	0.3%	0.0%	-1.0%	0.0%

Country by region	Year	Total	profes-sional, tecnhical and rela-ted workers	Adminis-trative and mana-gerial workers	Clerical and related workers	Sales workers	Service workers	Agricul-ture, forestry etc. workers	Produc-tion workers	workers not classif-iable occu-pation
ASIA:										
Bahrain	1981	M 124	9.1%	1.7%	10.8%	7.8%	18.0%	4.0%	48.1%	0.5%
	1982	M 126	8.9%	3.9%	9.8%	6.6%	18.4%	3.5%	47.2%	1.5%
	change:	1.6%	-0.2%	2.2%	-1.0%	-1.2%	0.4%	-0.5%	-0.9%	1.0%
	1981	F 14.8	33.8%	0.7%	30.4%	1.4%	31.1%	0.0%	2.0%	0.0%
	1982	F 15.3	30.7%	2.0%	31.4%	0.7%	32.7%	0.0%	2.0%	1.3%
	change:	3.4%	-3.1%	1.3%	1.0%	-0.7%	1.6%	0.0%	-0.1%	1.3%
Indonesia	1978	M 32905	2.0%	0.1%	4.4%	11.3%	4.6%	62.7%	14.9%	0.0%
	1982	M 37065	2.8%	0.1%	4.7%	11.3%	3.2%	55.2%	22.2%	0.6%
	change:	12.6%	0.8%	0.0%	0.3%	0.0%	-1.4%	-7.5%	7.3%	0.5%
	1978	F 18875	2.1%	0.0%	0.9%	21.3%	6.1%	57.8%	11.8%	0.0%
	1982	F 20738	3.2%	0.0%	1.5%	19.9%	5.5%	53.7%	16.2%	0.0%
	change:	9.9%	1.1%	0.0%	0.6%	-1.4%	-0.6%	-4.1%	4.4%	0.0%
Japan	1981	M 34190	7.1%	6.3%	12.7%	14.6%	6.3%	8.4%	44.3%	0.2%
	1985	M 35030	8.4%	5.6%	12.9%	15.3%	6.5%	7.5%	43.4%	0.5%
	change:	2.5%	1.3%	-0.7%	0.2%	0.7%	0.2%	-0.9%	-0.9%	0.3%
	1981	F 21620	9.7%	0.6%	23.6%	14.4%	11.8%	12.3%	27.4%	0.2%
	1985	F 23040	10.6%	0.6%	24.7%	14.1%	11.8%	10.5%	27.3%	0.3%
	change:	6.6%	1.0%	0.1%	1.1%	-0.4%	0.0%	-1.8%	0.0%	0.1%
Kuwait	0	M 0								
	1981	M147294	10.6%	2.1%	10.6%	5.5%	9.2%	1.4%	60.6%	0.0%
	change:	-								
	0	F 0								
	1981	F 7841	39.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	change:	-								

Country by region	Year	Total	profes-sional, tecnhical and rela-ted workers	Adminis-trative and mana-gerial workers	Clerical and related workers	Sales workers	Service workers	Agricul-ture, forestry etc. workers	Produc-tion workers	workers not classif-iable occu-pation
Republic of Korea	1981 M	8687	4.6%	2.3%	9.6%	13.1%	5.9%	30.9%	33.5%	0.0%
	1985 M	9107	6.2%	2.3%	12.4%	13.6%	6.9%	22.7%	36.0%	0.0%
	change:	4.8%	1.5%	0.0%	2.8%	0.4%	1.1%	-8 2%	2.5%	0.0%
	1981 F	5361	3.4%	0.1%	7.9%	16.9%	13.0%	39.1%	19.8%	0.0%
	1985 F	5828	5.3%	0.1%	10.2%	18.3%	17.0%	27.6%	21.4%	0.0%
	change:	8.7%	1.9%	0.1%	2.3%	1.4%	4.1%	-11.5%	1.7%	0.0%
Singapore	1981 M	717.8	8.7%	6.9%	9.1%	13.6%	9.5%	1.7%	42.8%	7.7%
	1985 M	734.3	10.1%	7.2%	8.0%	15.0%	8.3%	1.3%	42.7%	7.4%
	change:	2.3%	1.4%	0.3%	-1.0%	1.5%	-1.2%	-0.4%	-0.2%	-0.3%
	1981 F	395	9.8%	2.2%	27.6%	11.3%	13.7%	1.1%	34.0%	0.3%
	1985 F	420	11.0%	3.1%	29.9%	13.2%	16.7%	0.7%	25.2%	0.1%
	change:	6.3%	1.3%	0.9%	2.3%	1.9%	3.0%	-0.4%	-8.8%	-0.2%
Sri Lanka	1980 M	715.3	3.6%	1.8%	10.3%	4.4%	0.0%	0.0%	0.0%	80.0%
	1984 M	612.9	4.7%	2.4%	12.1%	3.3%	0.0%	0.0%	0.0%	77.5%
	change:	-14.3%	1.2%	0.6%	1.8%	-1.1%	0.0%	0.0%	0.0%	-2.5%
	1980 F	363.1	1.5%	0.4%	6.0%	2.3%	0.0%	0.0%	0.0%	89.8%
	1984 F	343.7	1.5%	0.5%	8.7%	2.1%	0.0%	0.0%	0.0%	87.2%
	change:	-5.3%	0.0%	0.1%	2.7%	-0.2%	0.0%	0.0%	0.0%	-2.6%
EUROPE:										
Denmark	1981 M	1059	14.4%	6.7%	9.9%	6.6%	6.6%	4.0%	51.5%	0.5%
	1985 M	1384	16.5%	5.3%	11.9%	6.5%	5.7%	8.9%	44.6%	0.5%
	change:	30.7%	2.1%	-1.3%	2.0%	-0.1%	-0.9%	5.0%	-6.9%	0.0%
	1981 F	963	28.2%	1.2%	25.2%	8.1%	25.0%	0.8%	11.2%	0.2%
	1985 F	1142	29.6%	1.1%	24.2%	7.8%	19.7%	0.9%	16.5%	0.4%
	change:	18.6%	1.3%	-0.1%	-1.0%	-0.4%	-5.4%	0.1%	5.3%	0.1%

Country by region	Year	Total	profes-sional, tecnhical and rela-ted workers	Adminis-trative and mana-gerial workers	Clerical and related workers	Sales workers	Service workers	Agricul-ture, forestry etc. workers	Produc-tion workers	workers not classif-iable occu-pation
Germany Fed.Rep. of	1980 M	16782	13.6%	3.9%	13.4%	6.1%	7.8%	4.5%	49.3%	1.3%
	1984 M	16436	14.4%	4.9%	12.1%	6.6%	8.4%	4.6%	47.6%	1.4%
	change:	-2.1%	0.7%	1.0%	-1.3%	0.5%	0.5%	0.1%	-1.6%	0.2%
	1980 F	10092	14.1%	1.3%	30.7%	12.9%	16.3%	6.9%	15.9%	1.9%
	1984 F	10171	16.1%	2.1%	29.5%	13.5%	17.1%	6.7%	13.1%	1.9%
	change:	0.8%	2.0%	0.8%	-1.3%	0.6%	0.8%	-0.2%	-2.8%	0.0%
OCEANIA:										
Australia	1981 M	4058	12.9%	8.4%	8.0%	6.8%	5.5%	8.6%	49.9%	0.0%
	1985 M	4009	14.1%	9.1%	7.9%	7.0%	5.6%	8.5%	41.5%	0.0%
	change:	0.8%	1.2%	0.6%	-0.1%	0.2%	0.1%	0.0%	-8.4%	0.0%
	1981 F	2336	18.2%	2.5%	33.7%	12.4%	16.1%	4.6%	12.6%	0.0%
	1985 F	2557	18.6%	3.1%	34.7%	12.5%	16.3%	4.2%	10.6%	0.0%
	change:	9.5%	0.4%	0.6%	1.1%	0.2%	0.2%	-0.4%	-2.0%	0.0%

Notes: Employment is defined as in Table 1

Source: ILO Yearbook of Labour Statistics (1986)

modern manufacturing sector from the 1960's onwards has been the relocation of industries from developed countries to developing ones, with their high labour content and low capital intensity.

The relocation itself was possible because of spectacular changes in communication, transport and production technology. The introduction of computer and satellite technology opened up new possibilities of supervising production, which could then be dispersed globally. The scope of distributing production over a wide area increased because the new technology made it possible to fragment complex production processes into separate elements in such a way that skilled operations could be separated effectively from unskilled or semi-skilled ones. In this way, companies could locate their research, development and the initial capital intensive stages of prodcution primarily in developed countries, while the labour of women in the developing world could be used for the labour-intensive, routine, intermediary operations. The clothing, textiles and electronics industries played a central role in this structuring of a new international economic order, whereby nearly three million young women, already by 1980, were producing clothing, textiles and electronics for the world market, mostly from the newly industrialising countries.[8]

Government officials, as well as international agencies such as the World Bank and United Nations Industrial Development Organisation (UNIDO), optimistically encouraged this pattern of development as a possible solution to widespread unemployment in many countries of the developing world. The result was that a sizeable share of the newly created industrial capacities was built up as part of the international production and distribution network. Specially designed export-processing zones were set up to attract foreign investment. In these zones, female employment

has been outstandingly high. The share of female workers in such zones invariably ranged between 75 and 90 percent. Thus the emergence of export-oriented manufacturing in such zones significantly contributed to providing non-traditional jobs for women.

The rationale for and the economic and social benefits from this specific type of employment have been a subject of heated controversy among development economists. The high costs of providing these employment opportunities, especially in terms of investment infrastructure, have been questioned; the quality of employment has been the object of poignant criticisms. Much of the employment proved to be of a transitory nature and ill-paid. According to an OECD report in 1984, apprentices accounted for 30 to 40 per cent of the labour force employed in the clothing and electronics industries in the export processing zones.[9] The health hazards were also observed to be high. Byssionosis or 'brown lung' was a common occurrence among female workers in the clothing industry. Electronic workers on the assembly line developed eye problems after only one year of employment. Moreover, in spite of its clean and clinical image, electronic assembly work brought workers the risk of being exposed to dangerous chemicals.[10] The advantages accruing to host countries were also of a limited nature: the backward linkages to the domestic economy were negligible, and consequently there was little scope for the benefits of technology-transfer. After two decades of experiments with this model of growth, there is, understandably, a search now for alternatives for achieving equality for women in the world of industrial work.

The major direction in thinking is now to emphasize that industrial participation by women cannot be or should not be defined exclusively in quantitative terms: it is the <u>quality</u> of industrial employment, as

indicated by the skill-component of jobs, that should also be an essential criterion. This is particularly important as the future of low-skill repetitive jobs relocated in the developing world looks uncertain at the advent of the recent industrial restructuring - a restructuring that results from changed management strategies and from the new vintages of technology in the developed world.

1.4 Information Technology and Biotechnology: Uncoupling of Manufacturing Production from Manufacturing Employment

Many of the manufacturing industries, including electronics, textiles and clothing, are now poised to adopt a fully integrated computer-controlled system. Such a system contrasts with the partial and piecemeal computerized automation adopted so far. In managerial terminology, the 'islands of automation' are now to be replaced by an 'integrated system' where one central computer will control all the machine tools, work stations and the transference of components and tooling.

Besides the potential overall control that the system offers to management, it has the unique advantage of producing a wide range of goods in small numbers: the economies of scale are now being superseded by the economies of scope, with the help of the 'Flexible Manufacturing System'.

The world economy in this scenario is going to be increasingly characterised by an 'uncoupling of manufacturing production from manufacturing employment'[11], starting from the introduction of revolutionary technical changes. Labour costs, and the comparative advantage of the developing countries dependent on them will, as a result, rapidly lose their significance. This transition into the 'factory of the future' is by no means going to take place overnight. Ample empirical evidence suggests that, whilst the trend towards higher levels of factory

automation is very clear, the average level of production automation is still far below what is technologically feasible. In practice, it is still enormously difficult, costly and time consuming to move from the use of 'islands of automation' to fully integrated systems of production. And even when technically feasible, decisions to invest in high level automation technology are just as likely as any others to be held back by economic, social and managerial constraints.[12]

But the move towards 'the factory of the future' is already discernible and it is leading to the relocation 'back North' of automated, previously labour-intensive, processes in areas such as textiles and electronics. Some newly industrialising countries themselves are investing in the new vintage of technology. Hong Kong, for example, has invested heavily in computer-aided machines; $19 million in 1984 alone on the computerised cutting machine. Similar investments are taking place, in South Korea, Taiwan and Singapore.[13] In this environment, the hopes of many second-generation newly industrialising countries to repeat their preceding successes may prove difficult. For them, attracting foreign investment will require 'that the training of technical labour would be done rapidly enough, and on a large enough scale to foster a second stage of "off shore" productive decentralisation from the North's industrial base'.[14]

The implications of this next stage of computer technology are worth noting for a programme of training for women in new skills. The robots are not likely to replace human labour entirely, but the need for direct operatives will be drastically reduced. At the same time, there will be a need for a new type of core workers who are 'functionally flexible'. As Works Management, November 1985, states:

> The age of the individual craftsman is passing, to be replaced by a new breed of multi-skilled workers to look after complex integrated systems which might involve anything from hydraulics through electronics, electrics and pneumatics.

In other words, there will be a greater demand for technical and engineering skills, rather than for the types of skill women are taught at home, which give them dexterity in assembly-line jobs.

The future employment potential for women workers in the assembly line jobs of global factories is also threatened by changing market and management strategies. As the 'economies of scope' replace 'economies of scale', companies rely on fashion and design management as a prudent market strategy. In some areas 'design changes' have become far more an important market strategy than 'price-competitiveness'. Hence, it has become cost-effective for international companies to locate supply near the market, in order to reduce turn-around time. Moreover, even for cheap labour, the companies can rely on labour in high-unemployment areas or depressed regions of the developed world; they can also make use of the sizeable immigrant communities, hard-hit by unemployment and recession, willing to work in the 'cash-in-hand' economy.[15]

Relocation near the market has likewise been expedited by the adoption of the Japanese 'Kan-ban' system of management in other parts of the rich world. This is a system that relies on an efficient network of local subcontractors, willing and able to supply material to the main factory 'just-in-time'; the system saves the factory the cost and trouble of hoarding stock of components 'just-in-case' they are needed. That Toyota relies on 36,000 local subcontractors has assumed the proportion of folklore in the western world, and the trend in the West has been to follow this example.[16]

Again in this context, the prospect of attracting foreign investment looks rather daunting for smaller and newer industrialising countries. For investing countries, the size of the domestic market and the quality of the workforce in the prospective host country will increasingly be of greater significance than the cheapness of labour. They are therefore likely to favour countries such as India, Mexico or Brazil rather than the ones such as Sri Lanka, Bangladesh or Thailand. For the majority of the smaller and newer countries, therefore, the future strategy for human resource development for women workers should be geared towards diversified patterns of development, more than towards meeting yet further the needs of export-oriented industries.

This approach makes sense. In spite of the growing publicity over women's employment in the export-oriented industries, only three million or so are today engaged in export-led production, and of these only one million are working in EPZs. The remainder of the 166 million women workers are employed in production activities that are primarily, or to a very large extent, geared to domestic markets. In order to maintain, if not augment, women's share in the world of paid work, education and training programmes should also monitor the gaps in skill needed for this wider section of the market economy.

As Chart 1 shows, it is not only the information technology but also the impending spread of biotechnology that calls for an effective programme of human resource development, particularly in the context of women's employment. The sectors and subsectors that are already undergoing visible changes are food processing, pharmaceutical and many other chemical industries - some of the major sources of employment for women in the developing countries. The impact of biotechnology is in many ways going to

Chart 1: Women's Manufacturing Employment and the Agents of Change

The Key Industries for Women in the Developing World	Agents of Change
Textiles and Clothing	Computer Technology
Electronics and Electrical Goods	Laser
Printing, Publishing and Other Allied Industries	Fibre Optics
Chemical Products	Biotechnology
Food Processing and Related Industries	

Source: International Labour Office (Geneva) for the state of employment and current literature for the state of technology

be even more deeply felt than that of computer technology in the late twentieth century; and there will be no place to hide from such a revolutionary change even for the 'bystander' countries. Improved and new methods of agriculture and industrial production in the industrialised countries will displace more traditional products of the developing countries. A good example of the kind of current and future displacement of workers through the application of biotechnology is that of sugar, for which fructose made from corn or maize grown in the industrialised countries is emerging as an economically viable and more widely used substitute. There has already been a tremendous growth in the use of high-fructose corn sweetner produced with help from immobilized enzyme technology in the United States and in Japan.[17]

This displacement has spelled disaster for suger exporting countries as they can no longer control the price or the quality of their exports. The consequence has been not merely the displacement of an export crop, but also the dislocation of the industrial workforce involved in suger production and related processing industries in such countries.[18]

The application of tissue culture technology will further enhance the displacement of women from the manufacturing workforce in the developing world. Industrial tissue culture has distinct advantages over the traditional technique of extracting, for example, chemicals from plants. Tissue culture yields products which are more easily purified and ensures that both the quality and the quantity are predictable and planned. Given these advantages, it seems likely that there will be increasing shifts towards tissue culture production even in some of the developing countries. This shift, however, will imply the replacement of direct labour as the number of workers needed for tissue culture production tends to be much lower than in traditional industries that produce chemicals from plants.

Moreover, the tissue culture factories themselves are unlikely to generate significant employment, since these factories are highly automated through the use of computer-guided production techniques[19]. It is too early to assess the full implications of the introduction of biotechnology on the structure of employment, yet the emerging evidence indicates that the new jobs, in the age of biotechnology, are going to be those that will demand a high level of technical skills with managerial competence[20].

The prospect for women for retaining their share of employment in industries such as food processing or chemical industries will depend on a number of factors.

First, on the ability of developing countries to create an institutional and educational infrastructure that will promote the necessary skills. Several developing countries, notably Argentina, Brazil, India, Mexico, the Philippines and Thailand, have already given high priorities to developing their own national capabilities in biotechnology;

Second, on the success of the developing countries in resisting the recent moves towards imposing the intellectual property law over the fruits of research undertaken in the developed countries;

Finally, on the willingness and the support of national governments and the intergovernmental organisations, such as the International Centre for Genetic Engineering and Biotechnology, for extending the opportunity of acquiring relevant skills to women and men alike.

1.5 Female Employment and the Nature of Participation

1.5.1 Formal and Informal Sector

The assessment of women's current and potential contributions is generally made on the basis of published statistics. A word of caution is necessary here. There is always a bias in offical employment statistics toward recording large scale factory employment. Work in small, less formally organised and often unregistered units is usually not recorded in official employment statistics. This phenomenon may lead to an overestimate, as easily as to an underestimate, of the increase in female employment. When women employed in the unorganised sector lose their jobs because their products have been replaced by the output of large and organised factories, the 'new' jobs for women created in the organised sector lead to an overestimate of the true situation. The displacement of women's work in rural industrial activities, mainly food-processing, is well established. The case of women rice-huskers in Indonesia, whose livelihood was wiped out by the introduction of rice mills, is perhaps the best known.[21] Similarly, because cheap plastic goods have superseded many traditional utensils such as baskets, pottery and cutlery, some previously made by women, women's jobs have been lost.

On the other hand, statistical bias in some cases also leads to an underestimate rather than an overestimate of total net job creation for women. Domestic outworkers carrying out piecework operations, for example, can in some industries substitute satisfactorily for factory employees. Theirs are activities in which the production line does not have to be physically integrated and the equipment used may not be too large. Again, such activities are ones which tend not to need constant technical monitoring and where the standard of quality control does not have to be too exacting.

Many processes meet these conditions, especially in light industrial type operations; the clothing industry is a major example but not the only one.[22] Women make up the bulk of domestic workers, basically because domestic piecework is a way of reconciling unpaid household work and childcare with wage labour.

There are indications that manufacturing outwork is on the rise both in the developed and in the developing countries. In Latin America, the informal sector, including domestic outwork, has always been large; and in the present economic climate of debt crisis, its importance is still rising.[23] A similar experience has been seen in some parts of Africa.[24]

It is important here to stress that the role of the informal sector, in the context of manufacturing industry, is not confined to goods produced for domestic use. It covers a wide variety of products for the national as well as for the international economy. As Maria Mies's study shows, home-based women lacemakers of Naraspur in India are essentially producing for the world market - and this example is by no means atypical.[25]

It is not only the destination but also the nature of products that is immensely varied in the informal sector. The composition of products is likewise changing with the introduction of new technology. Micro-electronic technology is making it possible to undertake production of many sophisticated products in smaller factories, or even in home-based units.

In the western world, the new technology has revolutionised the way production is planned and executed and has given rise to a widespread method of subcontracting to smaller units of production. The patterns of

organisation in sectors such as car components, printing and clothing typify the situation.[26] The companies prefer to decentralise work as much as possible, while keeping tight control over the market, quality and the brand image. In management jargon, the companies have become 'hollow corporations'.

1.5.2 Small and Large Firms: The Invisible Link

The phenomenon of subcontracting to smaller units of production is not confined to the rich part of the world. The trend towards 'hollow corporations' is discernible in many parts of the developing world as well. The case of 'putting out' to smaller, and in many cases unregistered, units, is well documented in the clothing and textiles industry of poorer countries.[27] The advantages to the large companies are many:

a) putting out offers flexibility in supply to meet seasonal demands;

b) it reduces overhead costs;

c) it lowers wage-costs and trade union militancy.

A survey of the Coimbatore district in India, which has taken to powerlooms in a big way, shows that an increasing number of powerloom weavers are now working on orders from the composite textile mills of the region, which could increase production without paying wages at mill rates or expanding their investment in looms and other infrastructure.[28] Indeed, in India, from 1970 onwards, there has been an increasing tendency towards smaller units becoming ancillaries to big units. The trend is particularly visible in the production of light producer and consumer goods - a sector that provides much industrial employment to women. While large and small units previously shared common markets on the basis of the sector's horizontal division, they are now sharing a common production process by specialising in different stages of production. One might call this a vertical

disintegration of the production process. In the Calcutta region of India, more and more small manufacturing units have now switched over to working on orders for components for large plants that produce electric fans.[29]

Does small, in this context, bode well for women workers? The answer is not simple to offer and demands a SWOT (Strength, Weakness, Opportunities and Threats) analysis. Women, as workers, receive little protection and few benefits in their employment as wage-earners, either as outworkers or as employees of small units. On the other hand, the growth of the unorganised sector opens up a new channel for employment in those areas of industry that were, in the past, monopolised by men in factories of the organised sector. Factories that are governed by labour and employment legislation are often less willing to employ women than men. This is because women are perceived as more expensive to hire, since the legislation puts the cost of maternity leave, nursing breaks or creche directly on the employer. In the absence of these restrictions in smaller units however, employers often prefer to hire women, as women are seen as less militant and more 'manageable'.

1.5.3 The Rise of Part-time Work

The rise of female employment in the so-called 'informal' sector of the developing world has its mirror image in the growth of part-time, shift-work and contract jobs in the developed world. The increase in part-time jobs in developed countries is directly related to the flexibility in work contracts that employers are now successfully seeking. In Britain, for example, 5 of the 21 million who are employed work part-time (that is, one in four workers), and 90 per cent of the part-timers are women. The situation in Britain is typical of an overall trend in OECD countries. The rapid expansion of part-time employment in

virtually all member countries over the past two decades is one of the most significant structured shifts in the OECD labour markets. Over the last decade, full-time employment was actually declining in a number of countries but part-time employment was expanding.[30] The European Commission's survey of the position of part-time workers indicates that these do not enjoy the same privileges and protection as full-time workers.

1.6 Prospects for Self Employed Women Entrepreneurs

The growth of part-time work has not been perceptible in developing countries. In these, flexibility in employment contracts is being increasingly sought by large companies through the 'putting out' of work. This strategy creates a vulnerable increasingly feminised workforce; yet it also offers a new opportunity of 'setting up on their own' to women workers themselves. There is an increased potential of moving on from being a wage-earner to being a self-employed woman entrepreneur.

The official international statistics understandably do not reflect the true situation. Besides the problem of collecting data in this area, there is the difficulty that Table 7, for example, groups together employers and own-account worker. This combined category is heterogeneous, comprising, in the case of women, very few employers and a large number of own-account workers, who have in common only the fact that they are not employees. The published figures reveal some definite pattern. As the Table 7 shows in richer countries the proportion of employer and own-account worker in the total employment generally is small. However, a comparison between the Table 7 and Table 8 indicates that even in a poor country such as Bangladesh, the percentage of employer and own-account worker is much lower in the manufacturing sector than in the economy as a whole. It is often easier and less expensive to set up on one's own in the services sector than in the manufacturing sector of the developing countries. A large

Table 7: Percentage distribution of the total male and female workforce by employment status in a selected number of countries (thousands and percentages)

Country	Year	Sex	Total	Employer and own account worker	Employee	Unpaid family helper	Other
			0	1	2	3	4
AFRICA:							
Botswana	1981	M	189,070	3.2%	47.4%	41.1%	8.3%
		F	127,418	2.9%	31.4%	51.8%	13.8%
Egypt	1983	M	10,163,800	27.9%	53.4%	13.0%	5.7%
		F	2,174,900	17.0%	42.3%	30.0%	10.6%
AMERICA:							
Bermuda	1980	M	17,232	11.2%	85.7%	0.1%	3.0%
		F	14,204	3.4%	92.2%	0.9%	3.5%
Canada	1984	M	7,169,000	10.3%	88.7%	0.4%	0.6%
		F	5,231,000	6.7%	90.3%	1.7%	1.3%
Costa Rica	1984	M	618,866	25.7%	67.8%	6.5%	0.0%
		F	175,560	9.1%	88.9%	2.0%	0.0%
United States	1985	M	65,967,000	10.0%	89.1%	0.2%	0.7%
		F	51,200,000	5.6%	92.6%	0.7%	1.1%
ASIA:							
Bangladesh	1983	M	25,958,000	40.3%	41.7%	16.1%	2.0%
		F	2,535,000	15.9%	68.6%	11.0%	4.5%
Hong Kong	1985	M	1,681,000	14.1%	81.6%	0.5%	3.8%
		F	956,100	2.7%	89.6%	4.4%	3.3%
Indonesia	1980	M	34,999,320	56.0%	29.4%	11.6%	2.9%
		F	17,110,606	44.9%	22.2%	28.7%	4.2%
Japan	1985	M	35,960,000	17.5%	76.9%	2.8%	2.9%
		F	23,670,000	12.2%	65.4%	1.9%	2.9%
Korea, Rep. o	1985	M	9,585,000	35.7%	55.1%	4.2%	5.0%
		F	5,969,000	20.7%	47.1%	29.9%	2.4%
Nepal	1981	M	4,479,944	84.1%	11.8%	1.7%	2.4%
		F	2,370,942	90.3%	3.8%	4.0%	1.8%
Singapore	1985	M	766,133	17.4%	77.5%	0.9%	4.2%
		F	437,904	5.4%	87.0%	3.5%	4.1%
Sri Lanka	1981	M	3,736,168	29.9%	55.2%	1.8%	13.1%
		F	1,280,345	9.6%	55.3%	3.1%	32.0%
Thailand	1982	M	13,500,000	39.7%	28.3%	29.4%	2.7%
		F	12,248,800	17.4%	19.5%	58.6%	4.6%
EUROPE:							
Germany. F.R	1985	M	16,907,000	11.4%	87.3%	0.7%	0.7%
		F	10,775,000	4.8%	87.0%	7.0%	1.3%
Greece	1981	M	2,584,580	44.2%	47.4%	4.8%	3.6%
		F	959,215	13.0%	52.6%	28.2%	6.3%
Portugal	1981	M	2,656,129	21.0%	72.9%	1.6%	4.5%
		F	1,478,036	14.9%	69.0%	3.9%	12.2%
OCEANIA:							
New Zealand	1981	M	876,609	16.0%	79.5%	0.2%	4.3%
		F	455,736	6.9%	86.1%	1.1%	6.0%

Notes: Workforce as defined by the United Nations Systems of National Accounts and Balance, during a specific time period.
Source: ILO Yearbook of Labour Statistics, various editions.

Table 8: Percentage distribution of male and female manufacturing workforce by employment status in a selected number of countries (thousands and percentages)

Country	Year	Sex	Total a	Employer and own account worker	Employee	Unpaid family helper	Other
			0	1	2	3	4
AFRICA:							
Botswana	1981	M	3,473	3.4%	96.6%	-	-
		F	1,007	20.3%	79.7%	-	-
Egypt	1983	M	1,443,100	-	-	-	-
		F	254,300	-	-	-	-
AMERICA:							
Bermuda	1980	M	611	12.9%	85.6%	-	-
		F	331	7.3%	90.9%	-	-
Canada	1984	M	1,576,000	1.5%	98.5%	-	-
		F	636,000	0.9%	98.7%	-	-
Costa Rica	1984	M	75,162	17.9%	81.1%	0.9%	-
		F	30,884	12.9%	86.5%	0.6%	-
United States	1985	M	15,106,000	1.7%	98.2%	0.0%	-
		F	7,481,000	1.2%	98.6%	0.2%	-
ASIA:							
Bangladesh	1983	M	1,785,000	21.5%	69.6%	8.9%	0.2%
		F	698,000	24.6%	46.0%	29.4%	-
Hong Kong	1983	M	503,000	-	-	-	-
		F	430,000	-	-	-	-
Indonesia	1980	M	2,520,260	-	-	-	-
		F	1,840,397	-	-	-	-
Japan	1985	M	8,790,000	7.6%	91.0%	1.4%	-
		F	5,740,000	15.3%	75.8%	8.9%	-
Korea, Rep. of	1985	M	2,147,000	14.6%	84.4%	1.0%	-
		F	1,353,000	6.4%	87.4%	6.3%	-
Nepal	1981	M	28,115	-	-	-	-
		F	2,867	-	-	-	-
Singapore	1985	M	163,501	8.6%	91.1%	0.2%	-
		F	130,277	3.1%	96.2%	0.7%	-
Sri Lanka	1981	M	313,885	17.8%	81.6%	0.6%	-
		F	94,836	12.5%	86.6%	0.9%	-
Thailand	1982	M	1,129,800	20.6%	72.7%	6.6%	-
		F	876,700	22.8%	58.1%	19.1%	-
EUROPE:							
Germany. F.R of	1985	M	5,938,000	5.1%	94.8%	0.1%	-
		F	2,542,000	2.0%	96.3%	1.7%	-
Greece	1981	M	484,082	31.6%	65.6%	1.7%	1.2%
		F	180,240	9.8%	83.2%	5.2%	1.8%
Portugal	1981	M	648,812	9.6%	89.7%	0.5%	0.2%
		F	359,815	6.0%	93.3%	0.5%	0.2%
OCEANIA:							
New Zealand	1981	M	225,579	3.7%	93.7%	0.0%	2.6%
		F	85,551	2.9%	93.3%	0.2%	3.6%

Notes: Workforce refers to economically active population as defined in Table 7 .
Source: ILO Yearbook of Labour Statistics, various editions.

proportion of own-account workers are, in fact, contract workers, working either at home or in various workshops on a more or less casual basis. These workers do not enjoy any of the protection of labour legislation which applies to employees in the formal sector. Their earnings are very much lower than those of employees in the organised sector.

But the unorganised sector is precisely the one that absorbs the majority of the workforce in poor countries. In India, 89 per cent of working women are 'self-employed': they are not all engaged in manufacturing activities, but a sizeable proportion of them are.[31]

The present economic crisis in Tanzania has also led to a rise in the number of self-employed women entrepreneurs.[32] The trend is visible in Latin America as well. The momentum towards self-employment, one of the consequences of the debt crisis, could become a catalyst for making the position of women secure and visible in the manufacturing sector in the future. In the light of this, the experiments undertaken in giving assertiveness training, access to credit, and finance and management skills to self-employed women should receive greater attention and scrutiny.[33] Such training can put women in a stronger bargaining position even in the organised sector. It is worth remembering that many own-account self-employed women are merely those workers who could not find a job in the organised formal sector in the first place, through lack of social and educational opportunities or because of gaps in their skills.

1.7 Demographic Trends, Unemployment and Work Experience

The need to explore the future potential for women workers in industry assumes an added urgency in view of the current demographic trend. In 1985, there were 542 million women workers in the developing regions. (Table 9) There were barely 263 million in 1950, and according to ILO

Table 9: Female population, economically active population and crude activity rate, 1950-1985

	Population[1] (millions)		Economically active population[1] (millions)		Crude activity rate[2] (%)		Female share[3] (%)	
	1950	1985	1950	1985	1950	1985	1950	1985
World	1,260	2,403	412	790	32.7	32.9	34.6	36.5
Developing countries	805	1,756	263	542	32.7	30.9	33.6	34.7
Africa[4]	106	263	34	71	32.2	27.0	36.4	35.0
Asia and Oceania[5]	618	1,290	219	434	35.5	33.6	34.6	35.6
Latin America	82	202	10	37	12.6	18.5	17.9	26.6
Industrialised countries	454	647	148	248	32.7	38.3	36.7	41.1
Centrally planned economies[6]	157	218	71	100	45.2	46.1	47.7	47.1
Market economies[7]	298	429	78	147	26.1	34.3	30.2	37.9

[1] Absolute figures have been rounded to the nearest million without adjustment to group totals, which have been rounded independently. Therefore the sum of the component parts may differ from the totals.

[2] Ratio of total female economically active to total female population. Calculation based on unrounded figures.

[3] Ratio of female economically active to total (both sexes) economically active population.

[4] Excluding South Africa, included in the market economies.

[5] Excluding Australia, Cyprus, Israel, Japan, New Zealand and Turkey, included in the market economies.

[6] Albania, Bulgaria, Czechoslavakia, German Democratic Republic, Hungary, Poland, Romania, USSR and Yugoslavia.

[7] Northern America, Northern Europe, Southern Europe (excluding Albania and Yugoslavia), Western Europe and Australia, Cyprus, Israel, Japan, New Zealand and Turkey.

Source: ILO: Economically active population estimates and projections, 1950-2025, Vol 5, 3rd edition, Geneva, 1986.

projection, there should be about 1,000 million women workers by the year 2025. In other words, the number of women workers rose by 280 million between 1950 and 1985 and is expected to rise by 435 million between 1985 and 2025. The present ecological, political and economic crisis will make it difficult for the agriculture sector of the developing world, to absorb this swelling female workforce.

The problem of current and future rates of female unemployment assumes an added dimension when one looks at the age distribution of the unemployed in the developing countries. In poorer countries, where women (and men) join the labour market at an early age, youth unemployment, representing the under-24s, becomes more acute than in the richer part of the world. The preponderance of youth among unemployed women in specially acute in Caribbean and Latin American countries such as in Barbados, Jamaica and Costa Rica (see Table 10). There is a paucity of data concerning overall rates of unemployment in African countries because of the limited number of labour force surveys taken in them. The recent figures released by the International Labour Office, however, show that the rates could be very high. Both Botswana and Swaziland have about a quarter of the labour force unemployed. The rate of unemployment is particularly high among young women under twenty; the figures are 44% and 42% in Botswana and Nigeria respectively. (See Table 11). In Morocco, the unemployment rates are exceptionally high among young workers (below twenty-four years), with 36% and 34% among young men and women respectively. In Latin America and the Caribbean too, since the early eighties, there have been disturbing increases in unemployment, primarily as a result of the debt crisis. Overall unemployment rates in Puerto Rico, Barbados, and Trinidad and Tobago have been above 15 per cent in the mid 1980's and the rates in Venezuela, Uruguay and Chile are not much lower.[34]

Table 10 Number of Unemployed by sex and age in selected countries (1981 & 1985) (thousands)

Country/area		1981				1985			
		Total	Under 20	20-24	Over 24	Total	Under 20	20-24	Over 24
AFRICA:									
Ghana	M	23.135	6.005	7.601	9.529	0	0	0	0
	F	8.585	2.966	3.164	2.455	0	0	0	0
	Total	31.72	8.971	10.765	11.984	0	0	0	0
Mauritius	M	39.887	4.799[1]	23.096[2]	11.992	48.777	1.969[1]	25.517[2]	21.291
	F	16.634	8.97	7.618	0.046	16.037	3.58	6.476	5.981
	Total	56.521	13.769	30.714	12.038	64.814	5.549	31.993	27.272
Seychelles	M	1.974	0.335	0.468	1.171	2.426	0.732	0.702	0.992
(1983/85)	F	2.025	0.363	0.591	1.071	3.287	1.397	0.652	1.238
	Total	3.999	0.698	1.059	2.242	5.713	2.129	1.354	2.23
AMERICA:									
Argentina	M	108	18.7	23.1	66.2	150.5	37.2	27.7	85.6
	F	66.8	17	14.8	35	81.1	24.6	11.6	44.9
	Total	174.8	35.7	37.9	101.2	231.6	61.8	39.3	130.5
Barbados	M	4.6	1.8	1.3	1.5	8.6	2.3	2.6	3.7
	F	7.6	1.9	2.4	3.3	12.6	2.5	3.8	6.3
	Total	12.2	3.7	3.7	4.8	21.2	4.8	6.4	10
Canada	M	494	113	120	261	750	109	166	475
	F	404	91	84	229	578	82	116	380
	Total	898	204	204	490	1328	191	282	855
Costa Rica	M	47.78	18.44	16.51	12.83	42.49	12.94	16.62	12.93
	F	21.83	8.37	8.7	4.76	18.27	5.55	9.47	3.25
	Total	69.61	26.81	25.21	17.59	60.76	18.49	26.09	16.18

Country/area		1981				1985			
		Total	Under 20	20-24	Over 24	Total	Under 20	20-24	Over 24
Chile	M	311.6	52.7	89.6	169.3	351.1	35.5	109.4	206.2
(1981/84)	F	105.4	15.9	43.4	46.1	190.1	19	73	98.1
	Total	417	68.6	133	215.4	541.2	54.5	182.4	304.3
Jamaica	M	73.5	27.9	22	23.6	90.8	27.5	25.6	37.7
	F	180.5	46	52.9	81.6	178	42.2	56.7	79.1
	Total	254	73.9	74.9	105.2	268.8	69.7	82.3	116.8
Panama	M	26.68	7.07	13.95	5.66	38.92	10.31	19.58	9.03
(1982/85)	F	24.82	5.53	13.79	5.5	29.87	6.68	15.86	7.33
	Total	51.5	12.6	27.74	11.16	68.79	16.99	35.44	16.36
Puerto	M	138	19	34	85	156	15	38	103
Rico	F	46	6	13	27	55	5	16	34
	Total	184	25	47	112	211	20	54	137
Trinidad	M	25.5	8.8	7.8	8.9	46.4	11.8	14.9	19.7
& Tobago	F	19.9	5.1	5.5	9.3	26.4	6.2	8.1	12.1
	Total	45.4	13.9	13.3	18.2	72.8	18	23	31.8
United	M	4577	962	1144	2471	4521	806	944	2771
States	F	3696	800	833	2063	3791	661	794	2336
	Total	8273	1762	1977	4534	8312	1467	1738	5107
Uruguay	M	20.2	6.2	4	10	36.2	10.5	7.8	17.9
(1981/84)	F	22.2	4.6	4.9	12.7	47.5	9.5	11.7	26.3
	Total	42.4	10.8	8.9	22.7	83.7	20	19.5	44.2
Venezuela	M	226.39	62.71	66.56	97.12	533.48	90.14	148.96	294.38
(1981/84)	F	62.66	16.34	23.65	22.67	152.09	24.6	52.6	74.89
	Total	289.05	79.05	90.21	119.79	685.57	114.74	201.56	369.27

Country/area		1981				1985			
		Total	Under 20	20-24	Over 24	Total	Under 20	20-24	Over 24
ASIA:									
Cyprus	M	3.601	0.272	0.704	2.625	4.614	0.16	0.786	3.668
	F	2.278	0.419	0.711	1.148	3.688	0.419	0.873	2.396
	Total	5.879	0.691	1.415	3.773	8.302	0.579	1.659	6.064
Hong Kong	M	62.2	13.8	12.9	35.5	64	9.7	16.2	38.1
	F	31.5	9.2	8	14.3	31.1	11.3	10.5	9.3
	Total	93.7	23	20.9	49.8	95.1	21	26.7	47.4
Korea,	M	526	73	126	327	478	39	115	324
Rep. of	F	135	56	54	25	141	40	65	36
	Total	661	129	180	352	619	79	180	360
Philippines	M	418	117	125	176	643	141	207	295
	F	591	136	181	274	672	129	216	327
	Total	1009	253	306	450	1315	270	423	622
Singapore	M	20.32	3.07	6.95	10.3	31.88	2.05	9.32	20.51
	F	12.83	4.93	3.92	3.98	17.9	4.59	6.64	6.67
	Total	33.15	8	10.87	14.28	49.78	6.64	15.96	27.18
EUROPE:									
Germany,	M	616.3	61.7	11[illegible]	444.6	1132.2	78.1	184.6	869.5
F.R of	F	640.1	73.7	129.6	436.8	1018.7	96.3	204.6	717.8
	Total	1256.4	135.4	239.6	881.4	2150.9	174.4	389.2	1587.3
Italy	M	799	256	278	265	1054	286	374	394
	F	1096	323	312	461	1418	363	455	600
	Total	1895	579	590	726	2472	649	829	994

Country/area		1981				1985			
		Total	Under 20	20-24	Over 24	Total	Under 20	20-24	Over 24
Sweden	M	55	10	11	34	65	5	16	44
	F	52	12	10	30	60	5	14	41
	Total	107	22	21	64	125	10	30	85

Notes: Unemployment is defined as in the Resolution concerning statistics of the economically active population, employment, unemployment and underemployment, adopted by the Thirteenth International Conference of Labour Statisticians (Geneva, 1982)

1) 15-17 age group
2) 18-24 age group

Source: ILO Yearbook of Labour Statistics 1986

Table 11: UNEMPLOYMENT RATES BY SEX AND AGE GROUP: SELECTED AFRICAN COUNTRIES (LATEST YEAR AVAILABLE)

Country	Age Groups			
	All	Under 20 years	20-24 years	Over 25 years
Botswana (1984)				
Total	25.3	32.8	37.8	20.7
Males	19.3	23.5	28.8	16.3
Females	30.6	44.1	44.1	24.6
Malawi (1983)				
All	5.4	9.8	7.8	3.3
Males	4.9	9.7	6.1	2.9
Females	5.9	9.8	9.2	3.7
Nigeria (1983)				
All	5.7	27.6	16.1	1.8
Males	5.1	22.2	15.2	1.6
Females	6.9	42.0	18.2	2.1

Source: ILO Bureau of Statistics (Geneva, 1987)

Unemployment rates are generally lower in Asia than in the other developing regions. As Table 12 shows, countries with relatively low female unemployment rates are those which have successfully drawn a sizeable number of women workers into manufacturing production for export. Yet, the future of such production itself is currently at risk and is already leading to a rise in the female rate of unemployment in countries such as in the Philippines and Singapore. The pronounced current trends towards depressed commodity prices, falling remittances and increasing return migrations from the Middle East are also factors that will affect female (and male) unemployment in many Asian countries.

A programme of self-sustainable development for the majority of the developing countries seems essential in this context: a development that is geared to using not only the material resources available to a country, but also its current and potential human resources.

1.8 Social, Legal and Cultural Constraints on Women's Contribution

The contribution that women workers could make to this programme, however, will necessitate a fresh evaluation of the social, cultural and legal constraints that currently define women's position in the job market. The myth of women being basically secondary earners continues giving justification for recruiting them mainly for ill-paid jobs; this happens in the face of growing evidence that one in three families, on world average, is now headed by women.

It is also generally believed that women are inherently suited for unskilled and semi-skilled jobs, where manual dexterity is the major requirement rather than mental agility or sustained training. In reality,

Table 12: Unemployment rates by sex and age: selected Asian countries and area (early and mid-1980s)

County/area	Early 1980's				Mid-1980s			
	Total	Under 20	20-24	Over 24	Total	Under 20	20-24	Over 24
Hong Kong (1982, 1984)								
Total	4.2	12.1	5.6	3.0	3.6	13.3	5.7	2.4
Males	4.3	13.3	6.0	3.2	3.8	11.8	6.4	2.8
Females	4.1	10.8	5.2	2.6	3.3	14.8	4.7	1.4
Indonesia (1982)								
Total	3.0	8.5	8.4	1.0	n/a			
Males	2.7	8.0	8.2	0.8	n/a			
Females	3.6	9.1	8.8	1.3	n/a			
Republic of Korea (1982, 1985)								
Total	4.4	12.5	8.9	2.9	4.0	10.9	9.7	2.8
Males	5.5	14.5	11.9	4.1	5.0	12.2	13.8	3.9
Females	2.5	10.5	6.0	0.7	2.4	9.9	6.3	0.8
Philippines (1983, 1984)								
Total	4.1	7.2	9.8	2.5	6.1	9.7	14.5	3.9
Males	3.4	5.6	8.3	2.1	4.8	8.1	11.2	3.0
Females	5.3	9.6	12.2	3.1	8.2	12.2	19.9	5.4
Syrian Arab Republic (1983)								
Total	n/a				5.1	12.0	7.7	3.0
Males	n/a				4.3	8.9	7.6	2.9
Females	n/a				10.6	24.7	8.2	3.9
Singapore (1982, 1985)								
Total	2.6	6.3	3.7	1.6	4.1	7.9	6.6	3.1
Males	2.4	5.3	4.1	1.7	4.2	4.9	7.2	3.4
Females	2.9	7.3	3.2	1.5	4.1	11.0	5.9	2.3
Thailand (1982, 1984)								
Total	3.6	4.3	5.2	2.9	2.3	2.6	4.9	1.5
Males	2.7	4.0	4.3	1.9	2.0	3.0	4.6	1.0
Females	4.6	4.6	6.1	4.1	2.6	2.2	5.3	2.1

Source: ILO Bureau of Statistics (Geneva, 1987)

the occupational segregation by gender is primarily a consequence of the lack of opportunities that women workers experience with regard to vocational training.

The unequal performance of women in the job market can, in fact, be explained to a very large extent by women's reproductive and caring roles. With insufficient or non-existent social provisions for child-care (and elderly dependents) in most of the developing world, it is difficult for women workers to be seen as preferred workers for the positions of responsibility and power. The case studies undertaken by ILO with funding from the United Nations Fund for Population Activities in a selected number of countries reveal that employers associate higher costs with women employees on a number of grounds. Of the case studies, most significant was the Sri Lankan one, where the major deterrent in recruiting women at the management level was the fear that 'a whole work programme could be disrupted by maternity leave'.[35]

In addition, where legislation requires the maternity leave to be paid entirely by the employer, it adds to the reluctance of employers to recruit women in highly paid jobs. Maternity leave at the firms' expense also leads employers to prefer single women and to put pressure on women employees to leave, once they are married.[36]

Cultural constraints also play an important role. For example, in Bangladesh, where, because of Purdah, women's share in non-agricultural employment is very low, it was noted that the need to create separate facilities, such as dining areas, adds to the total cost and discourages employers from hiring women.[37] Women too, in such tradition-bound societies, find it daunting to bid for technically sophisticated and

responsible jobs. However, one should not exaggerate the cultural constraints upon the workers; the experience of women workers in the export-led garment industries of Bangladesh itself testifies to the openness of women even in a zealously Muslim, yet extremely poor, society. Barely four years old, this industry has already recruited nearly 150,000 young single women, a category traditionally subject to the most severe form of social control. The comment of a Bangladeshi woman is significant in this context: ' when I first started working to support myself, people had much to say against it. I knew that no one would give me a meal, so why should I care about their opinions? ... people with empty stomachs do not have to worry about social norms'....[38]

NOTES

CHAPTER 1

1. Calculated roughly on the basis of economically active female population in 1985 (Table 9) and slightly adjusted industrial sector share of the female labour force in 1980. The figure is to be treated only as an approximation to the actual figure.
2. Swasti Mitter, Common Face, Common Bond : Women in the Global Economy, Pluto Press, London, 1986.

   Susan Joekes, Women in the World Economy, INSTRAW/Oxford University Press, New York and Oxford, 1987.
3. Women at Work, ILO, Geneva, Number 1, 1985, p.39.
4. For a discussion of the 'perceived contribution' of paid work on women's bargaining power, see Amartya K Sen, Women Technology and Sexual Divisions, UNCTAD/INSTRAW, Geneva and New York, 1985.
5. Swasti Mitter, Common Fate, Common Bond

   Elizabeth Garnsey and Liba Paukert, Industrial Change and Women's Employment: Trends in the International Division of Labour, International Institute for Labour Studies, Research Series, No. 86, Geneva, 1987.
6. Women as Workers: Report of the IRENE/EADI Seminar on the Informalisation of Women's Labour, IRENE (Industrial Restructuring and Education Network Europe), Holland, 1986.
7. Third Tripartite Technical Meeting for the Clothing Industry, Report 1, Part 3, ILO, Geneva, 1987, p.27.
8. Swasti Mitter, Common Fate, Common Bond, p.44
9. A Basile and D Germidis, Investing in Free Export Processing Zones, OECD, Paris, 1984.

10. Health Hazards in Electronics: A Handbook, Asia Monitor Resource Centre, Hong Kong, 1985.

11. P Drucker, 'The changed world economy', Foreign Affairs, Spring 1986, p.775.

12. Kurt Hoffman, Managing Technological Change: The Impact and Policy Implications of Microelectronics, Report submitted to the Commonwealth Secretariat working group on the Management of Technological Change, Science Policy Research Unit, University of Sussex, 1985.

13. Swasti Mitter et al, Linked by the Same Thread: The Multifibre Arrangement and the Labour Movement, Oxford House, London, 1986, p.81.

14. M Castells, 'High technology, world development and structural transformation: the trends and the debate', Alternatives, Vol. II, 1986, p.305.

15. Swasti Mitter, Common Fate, Common Bond, Chapter 2, Section 2.

16. Charles Handy, Gods of Management, Pan Business/Management, London, 1985, p.166.

17. R Crott. FAST Occasional Paper No 55.

18. David Dembo, Clarance Dias, Ward Morehouse, 'Biotechnology and the Third World: Caveat Emptor, Development, Vol 4, 1987.

19. ibid, p.15.

20. Martin Kenny, 'The University in the information age: Biotechnology and the less developed countries', Development, Vol 4, 1987, p.65.

21. Susan Joekes, op cit, p.39.

22. A Portes and L Benton, 'Industrial development and labour absorption: a reinterpretation', Population and Development Review, Number 4, 1986, p.589-661.

23. Fiona Wilson, 'Labour Struggle and Clandestine Industry: the story of a labour petition in Mexico', Labour, Capital and Society, November 1986.

24. Marja-Liisa Swantz, 'The effect of economic change on gender roles: the case of Tanzania', Research paper prepared for the workshop on Gender and Equity, at the Society for International Development 19th World Conference, New Delhi, March 1988.

25. Maria Mies, The Lace Makers of Narspur: Indian Housewives Produce for the World Market, Zed Press, London, 1982.

26. Swasti Mitter, Common Fate, Common Bond, pp.105-115.

27. Andrea Menefee Singh and Anita Kelles Viitanen, Invisible Hands: Women in Home-based Production, Sage Publications, New Delhi, 1987.

28. I.S.A. Baud, Women's Labour in the Indian Textile Industry, Tilburg University, Holland, 1983.

29. Nirmala Banerjee, 'Large and small industry: Symbiosis or Matsyanyaya?' A paper presented at the seminar on Small Industry in New Delhi, 21-23 March. Organised jointly by the World Bank and the Institute for Economic Growth, New Delhi (mimeo).

30. Olive Robinson, 'Part-time employment and labour legislation in Britain', paper presented at the workshop on Women and Flexible Work, Leiden, 17-20 May, 1988.

    Jennifer Hurstfield, Part-timers Under Pressure, Pamphlet Number 47, Low Pay Unit, London, 1987.

31. Jaya Arunachalam, 'Women workers in the informal sector - unorganised, poor and exploited: A case-study from India, Working Women's Forum' paper presented at the Round Table Conference on Social Participation in Development, organised by the International Institute for Labour Studies at Laval University, Quebec, Canada, 25-28 May, 1987.

    Also, proceedings of National Workshop on Home-based Piecerate Workers, Gandhi Labour Institute, Ahmedabad, India, 17-19 November, 1987.

32. Marja-Liisa Swantz, op cit.

33. Malcolm Harper, Entrepreneurship for the Poor, Intermediate Technology Publications in association with German Agency for Technical Cooperation, London, 1984; Tutors Manual: Training Skills for Women Commonwealth Secretariat, Marlborough House, London, 1984.

34. Women at Work, ILO, Geneva, Number 2, 1987, pp.10-12.

35. Richard Anker and Catherine Hein, 'Why third world urban employers prefer men', International Labour Review, Vol. 124, Number 1, January-February, 1985, p.77.

36. ibid, p.78.

37. R H Chaudhury and N R Ahmed, Female Status in Bangladesh, Bangladesh Institute for Development Studies, Dhaka, 1980, p.65.

38. Naila Kabeer, Women in Bangladesh', New Left Review, Vol. 168, March-April, 1988, p.107.

CHAPTER 2

2.0 FACTORS AFFECTING WOMEN'S PARTICIPATION IN INDUSTRY

2.1 Trends in Industrial Growth

The last three decades have experienced an increase in women's share of industrial employment both in developed and developing regions. Whether women can maintain this momentum quantitatively and also improve their position qualitatively will depend much on the state of technology and the trends in industrial restructuring in various regions of the world.

In the formal, organised sector, where large and medium scale firms predominate, women's prospects of employment are likely to continue to be in the light industrial branches, such as textiles, food-processing or clothing, or in the assembly-line jobs of high-tech industries such as semi-conductors or consumers' electronics goods. However, the technological advances in many countries will make some of these 'feminised' skills less relevant, reducing the prospects of women even in such industries if they fail to gain access to relevant new skills.

In contrast, the informal or unorganised sector, where small firms and home-based units play important roles, is likely to absorb a greater number of women seeking manufacturing work everywhere. This is the sector which has always been a shock-absorber during periods of rapid structural adjustments; in addition, the current widespread use of subcontracting and 'putting out' of work, even in the most sophisticated, high-tech branches of industry, will increase the demand for women workers, as a flexible workforce.

In order to assess the future trends in this respect, it will be appropriate, however, to make a distinction between two types of economy:

a) those with strong manufacturing links to the world economy;

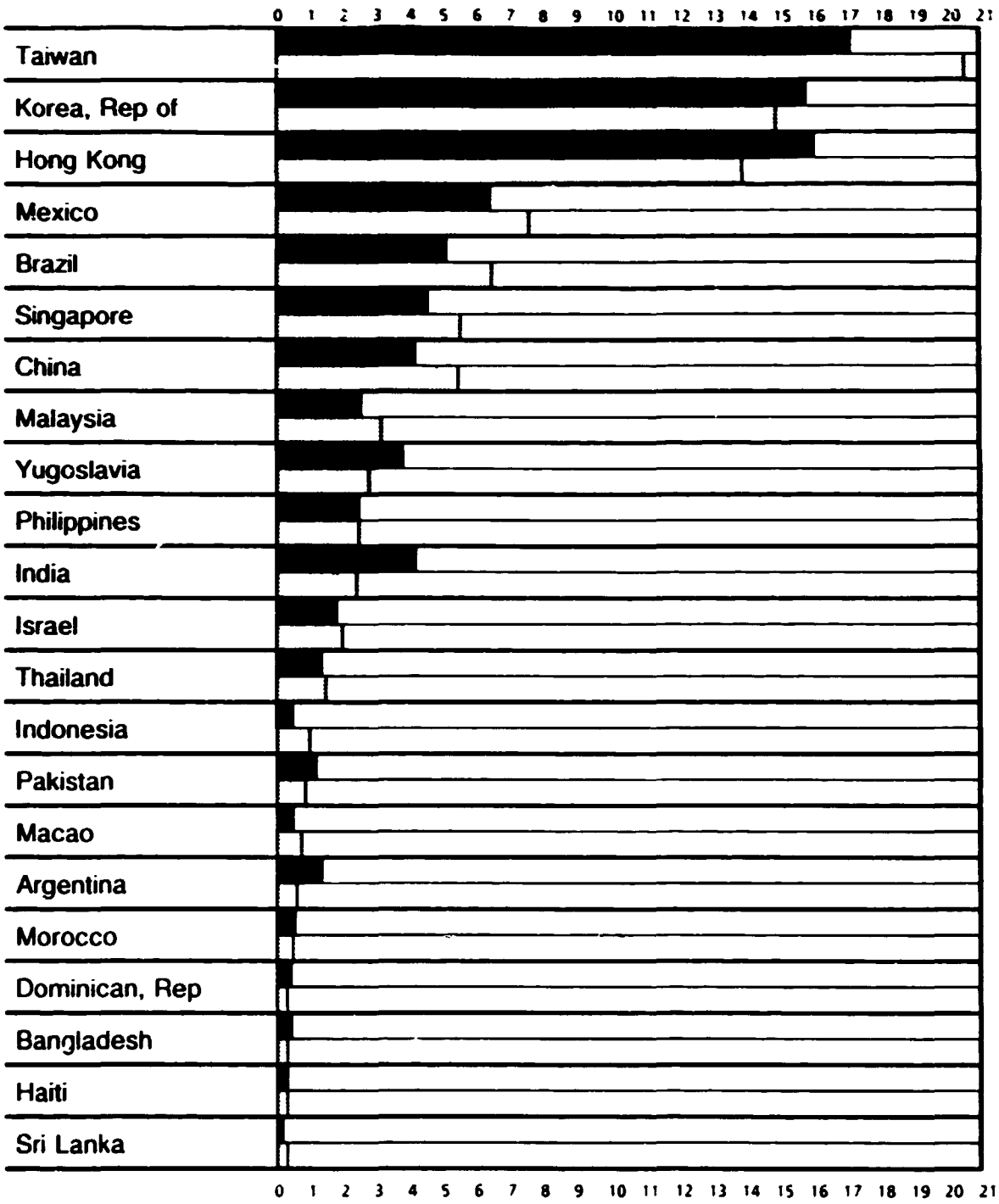
b) those with weak manufacturing links to the world economy.

The pattern of trade between the developing countries and the OECD is used here as one such basis of classification. As Chart 2 shows, the position of the various less developed countries, in terms of trade relations with developed countries, has not changed substantially between 1979 and 1984. The seven major suppliers are the same in both years (the six NICs and China). If anything, the share of these seven rose from 69.6 to 74.9 per cent of the total trade over this period, and that of the first ten from 78.3 to 83.0 per cent. Insofar as 'newcomers' emerged, this took place only at the expense of a few established exporters of lesser importance. The dominant position of the NICs remained unchallenged. Chart 2, therefore, indicates that only a limited number of the less developed countries have substantial linkages to the world economy through their manufacturing base. Hence it is in these countries that technological innovations, designed and implemented in developed countries, are going to have immediate implications on trade relations and thereby on female manufacturing employment.

2.2 Major Technological Changes: Impact on Employment and Skill-requirements

The changing composition of the manufacturing workforce in the developed regions of the world reflects the declining importance of manual skills in the overall production process. The adoption of new production techniques as well as the development of new products - two major outcomes of the introduction of information technology - significantly alter the

SHARE OF INDIVIDUAL SUPPLIERS[a] IN OECD IMPORTS OF MANUFACTURES FROM DEVELOPING COUNTRIES



a *In descending order 1984*

Source: OECD

organisation and nature of work in an enterprise. In metal trades, for instance, the gradual trend is now away from directly productive jobs towards various types of preparatory and monitoring tasks; as a result, manual skills are increasingly being replaced by cognitive skills.[1] This is consistent with recent findings of the Battelle Institute concerning the growing impact of microprocessors and microcomputers on employment;[2] they suggest that future jobs will require fewer manual skills and more innovative thinking, improved planning skills and greater capacity for teamwork. The future, thus, appears like this in manufacturing:

a) the proportion of managers, engineers and technicians is expected to increase;

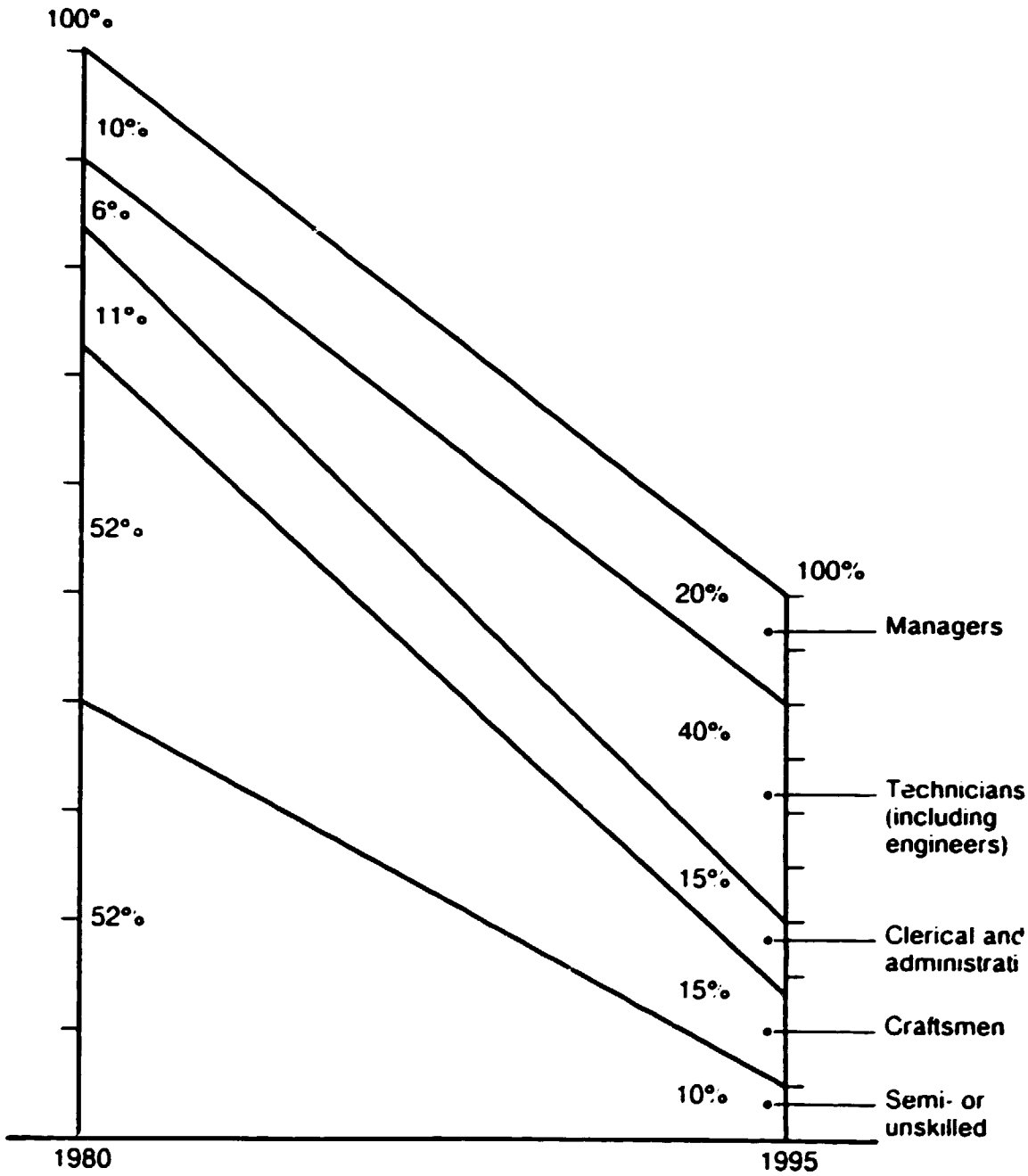
b) the proportion of unskilled and semi-skilled workers and craftspeople is expected to decrease;

c) these changes are likely to take place amidst a general decline in manufacturing employment, resulting from the labour-replacing effects of new technology.

Chart 3 shows, in a schematic form, the future implications of these changes in the context of the United Kingdom.

Similar are the trends in newly industrialising countries. In Hong Kong, manufacturers of electronics equipment are now expanding their managerial and, in particular, technical and engineering staff; at the same time they are reducing operative personnel, as they increasingly automate production and design their own products and manufacturing systems.[3] In the Republic of Korea, technologists able to manage automated production systems will, by the beginning of the 1990's, constitute the strategic new workforce at the expense of craftspeople and assembly-line workers.[4]

CHART 3: PROJECTED CHANGES IN THE VOLUME AND OCCUPATIONAL STRUCTURE OF EMPLOYMENT IN THE UNITED KINGDOM MANUFACTURING INDUSTRY, 1980 AND 1995



Source: Commission of the European Communities (in association with the journa *Futures*): *Eurofutures: The challenges of innovation*, The FAST Report (London, Butterworths, 1984) p100

The evidence inevitably points to the fact that, in the absence of counteractive measures, women workers will lose even the quantitative gains they have made in the last three decades.

The adoption of new technology is affecting the levels and nature of employment in all industries, including the ones that traditionally offer employment to women in the developed regions. The current and impending introduction of labour-saving computer-aided innovations is likely to make the dexterous skills of women redundant, reducing their employment prospects, even in the clothing industry - an industry that has been for decades the main provider of female machinist jobs.[5] The advances of new technology, consequently, erode the comparative advantages, based on cheap female labour, of developing regions.

The response of the NICs to this changed international economic order is important to study in this context. Their accent now is on an intensified shift to strategic upmarket activities. South Korea, for example, has made significant progress in moving up from consumer electronics to development of sophisticated electronic components, and its export successes in the automobile sector are well known. At the same time, Taiwan has become an important exporter of machine tools, and a number of the NICs have embarked on development in 'new wave' activities such as biotechnology. How far these countries can move upmarket depends largely on their capacity to make optimal use of the technological contributions of the advanced nations. The level of resources devoted by the NICs to research and development has been much lower than that prevailing in the highly advanced countries, but it is rising, most rapidly in South Korea; and the NICs are making notable efforts to step up education and training.

The more dynamic NICs have also resorted to types of partnership such as joint ventures, licensing and technical assistance agreements as means of integrating foreign technologies from multiple sources so as to develop 'indigenous' up-market products. Examples abound in advanced electronics and automobiles. For instance, the use that has been made of Italian design and modified Japanese Mitsubishi engines by South Korea's Hyundai's automaker or the link that Brazil's Embraer aircraft company has made with a number of firms under licensing agreements or joint ventures, notably for the production of light military planes.

Some of the NICs have also themselves begun to invest in the developed regions. South Korean electronics investment in the United States, the establishment of automobile production in Canada by Hyundai, investment by the Taiwanese plastics industry in the United States and by Hong Kong clothing manufacturers in Europe are examples of this new trend.[6] While such moves may be motivated by the desire to produce near the foreign market and thereby circumvent trade barriers, they also constitute a path to technology-transfer - by locating in closer proximity to the sources of relevant technology.

The competitive edge of a country, on the manufacturing side of international trade, very much depends, in this new environment, on speed in the adoption of innovations in production processes. The success of such adoption, however, hinges on the availability of trained personnel. This is because the computer technology increasingly comes in an integrated package from the developed regions as part of a turnkey system (hardware and software together). The Algerian experience typically demonstrates the difficulties faced in this situation by developing countries. Here the plants transferred through turnkey contracts were often faced with

difficulties such as breakdown, delay in spare parts deliveries, repair facilities which had to be realised by experts located abroad, and were therefore not efficiently used.[7]

Such difficulties also explain why, as the industrial infrastructure of the NICs developed, it became profitable for the multinationals to locate more varied and more complex manufacturing activities there. The foreign investments represent more than mere offshore transfer of assembly activities; they make an enhanced contribution to the host country's development and to the upgrading of its export package. Production of computer peripherals in several NICs and automobile investments in Brazil and Mexico, especially to make engines, exemplify investment carried out in this more dynamic perspective. The changing composition of manufacturing in the developing countries is also reflected in the trade figures, where 'machining and equipment' has increased its share in OECD countries, imports from developing regions (from 24.3 per cent in 1979 to 32.8 per cent in 1984), while the other categories just maintained or lost their ground.[8] The three largest increments in inputs from the developing countries occurred in electronic components, parts of office machines and telecommunications equipment.

2.3 Human Resource Development: A Determinant of Economic Competitiveness

In this emerging industrial global structuring, the comparative advantages of national economies are no longer going to be determined by natural endowments of raw materials and labour but are going to be primarily man-made. And here, exploiting the potential contribution of the female workforce will provide a definite competitive edge. The education and training programme for women workers needs careful planning in this context.

As the importance of manual skill and physical strength declines, a country can improve its competitiveness by utilising the cognitive skills of its female workforce. Opening up opportunities for women, in this scenario, will be a prudent policy, not only on the grounds of equity, but also for economic growth. The importance of developing a large pool of new skill - drawn from both female and male workers - is evident as a gap is perceived everywhere in the present stock of human resources in information technology. In the Netherlands, a report prepared by the Group for the promotion of a Computer Science University estimates that the annual need for people with higher education in computer science is 2,900, while only 1,200 students graduate in this subject every year.[9] In the United Kingdom, one in five firms using information technology feels that shortage of specialists threatens its survival.[10] The increase in effective demand for computer and software services was, on average, 22 per cent in the European countries of the OECD in 1984-85. The figure is similar in the growth in effective demand for personnel providing these services, which far outstrips the growth in supply. The strategic importance of information technology is also evident in NICs, as is demonstrated by the increasing number of joint ventures for software development, especially between Japanese firms, the Republic of Korea and China. New possibilities of exports from developing regions open up in this sector: export of software from India and Brazil is growing rapidly. The Republic of Korea and Singapore actively encourage development and export of software, by attracting foreign companies to use them as offshore development centres. The strategy works, as Korean and Singapore software developers work for a fraction of western wages.[11]

The steady supply of personnel trained in information technology is a vital condition for strengthening the manufacturing and trading base of the NICs.

This is important to them both for attracting foreign companies and for expanding their domestic productive base. A programme for human resource development for redressing the strategic skill shortages therefore has to address specifically two areas: management and technical knowledge.

There are no ready-made formulas for training people to manage technological change. Many skills will have to be acquired on the job, as managers learn to work with the new breed of 'know-how' essential for a company's success. To broaden the base of this management expertise, therefore, one has to ensure that women occupy a substantial number of managerial posts in the first place.

Next to the need of innovative managerial expertise, a country's comparative advantage increasingly depends on the assured supply of engineers, scientists and technicians. This quantitative demand is coupled with a need for qualitative strengthening of technicians' training. This will include training in computer-aided design (CAD), computer-aided manufacturing (CAM), data communication techniques, and production control and electronic data-processing techniques.[12] The need to receive broad training in mathematics and languages should be stressed as well.[13] In order to create an environment that could develop the attributes of such personnel, a close collaboration between industry and academic training centres will be necessary. This type of collaboration alone can generate new product ideas and create a powerful two-way flow of technical, innovative and entrepreneurial skills. It is in this context, again, that it is important to increase women's representation in industries - to provide role models as well as to release a new source of 'cognitive skills'.

Efforts to exploit hitherto untapped cognitive skills of women workers will be a prudent measure with the growing importance of biotechnology in the food processing and chemical industries. Biotechnology is clearly not labour-intensive, but neither is it highly capital intensive. Even the most important US biotechnology companies, such as Genentech and Cetus, spend no more than $25 million a year on research.

Biotechnology might more correctly be termed as knowledge-intensive. In fact, it is much easier to copy most biotechnological products than to copy the design of an automobile, for example. Also, the knowledge generated by biotechnology can be applied at widely differing levels of sophistication. Hence, those developing countries that have proper institutional infrastructure will be in a good position to take advantage of much of the information generated by research in the developed world.[14]

It is not only the technical skills that are necessary for building such an infrastructure; the knowhow to integrate the technology into economically justifiable production is equally important. Only in this way can an appropriate introduction of biotechnology be an harbinger of economic growth and prosperity. The experiments undertaken in Cuba and Mexico indicate that the new biotechnologies, by converting agro-industrial wastes into amio acids and single-cell protein, open up new possibilities for alleviating hunger and protein deficiency in the developing world. If used with competence, the application of biotechnology in this direction can generate additional employment in the agro-industries and related sectors.[15] The success of such ventures, however, will depend on the availability of technically trained personnel and the expertise to gauge the market. The countries that will gear themselves towards potential talents from a wider pool of human resources, consisting of women as well as men, will then have a greater chance of acheiving economic efficiency.

2.4 Role of Education and Training for Women in Industry

2.4.1 Training in the Formal Sector

The present pattern of education deserves close scrutiny in the light of the above argument. Even with an increase in literacy in most parts of the world, there are universal deficiencies in the number of males and females studying or employed in scientific and technological fields. Table 13 below indicates engineering as the field in which women are the least represented. In some of the most industralised countries, such as Japan, the Federal Republic of Germany, Italy and Switzerland, the representation of women is particularly low.[16] This finding reveals that the overall growth of a country alone does not diminish the sex-stereotyping in vocational training and occupations. The overall tendency at the academic level, as Table 13 shows, is that women are located in the humanities and social sciences and men in the natural sciences and technology. While this pattern of horizontal differentiation is subsequently reflected i the pattern of employment, there is also a vertical differentiation with women mainly at the lower levels of achievement and authority.

The mere introduction of practical technical training as an option in the educational system may not necessarily lead to girls and women choosing technical subjects in larger numbers th before. Special encouragement and counter-stereotype counselling is urgently needed. The pilot study of a new technical and vocational education in comprehensive schools in Great Britain, for example has shown that optional courses tend to be chosen according to traditional gender preconceptions. This implies that technology education may need to be part of compulsory schooling for both girls and boys.[17]

Table 13: The enrolment of women as a percentage of total enrolment in various fields of science by area in the early 1980s

Area	Educational science and teacher training	Social and behavioural sciences	Natural sciences	Mathematics and computer sciences	Medicine and health	Engineering	Agriculture	Total in scientific fields
Africa	30	25	20	20	30	5	15	25
Latin America and the Caribbean	60	55	50	45	50	10	20	45
Asia and Oceania	55	35	30	30	40	10	20	25
Western Europe	65	40	35	30	50	5	25	40
Eastern Europe	70	60	50	45	70	25	35	45

Source: Women at Work, No 1, 1986, ILO, Geneva

The low representation of women in technical and engineering training courses is also the result of women's reasoned reluctance to enter male occupations, which often seem demanding and incompatible with women's future role in child care and domestic labour. 'When girls "choose" typing or hairdressing and do not "choose" engineering or computing skills... (girls are) making the best of a bad situation; to be doing the only thing that seems possible; to be counting costs.' [18] Increased provision of child care in a society, therefore, contributes much to broadening the choice for women; as does increased flexibility in male attitudes towards domestic duties.

Enhanced women's participation in industry will depend greatly on the government support. Besides the provision of social care, the government's role is important in

a) allowing the relevant skills to be learnt;

b) ensuring women workers' access to them.

The case of the Republic of Korea is exemplary on the first count since there the government has - more successfully than others - managed to make research organisations responsive to market and industrial needs. It has also has succeeded in getting higher educational institutions to turn out graduates specifically for industrial research and innovations. But such programmes, if formulated without explicit provision of training for women workers, will be of limited scope. The experience of Algeria is more promising in this respect. A programme of in-plant training combined with courses in female training institutions is part of the efforts made by the government to encourage young people to be trained in order to accelerate the supply of skilled manpower required by trade and industry. The share of young women in total enrolment has gradually increased since 1975, and training programmes have been considerably expanded.[19]

The lack of technical and managerial training also impedes women's prospects in sectors and countries that have relatively weaker links to the world market through their industrial products. In Nepal, for example, where the efforts to increase female participation in education have been successful, there is still a striking shortage of women with technical skills. In 1985, only 48 of the 508 students enrolled in technical schools were female. Of these 48, again, 34 were trained as sanitary and health workers and very few were trained for manufacturing skills. Female participation in higher education in Nepal shows a similar bias. The overwhelming majority studied humanities and social sciences and relatively few science and technology. Significantly unemployment was highest among social science and humanities graduates and lowest among science and technology students.[20]

2.4.2 Training in the Informal Sector

While it is important to identify the gaps in skills that exist in a country and orient women's training programmes towards them, in the majority of developing countries, women seek and find jobs in the unorganised/informal sector more than in the formal. The garment industry in Delhi provides an example. The industry accounts for 60 per cent of the total annual garment exports from India. According to the official estimate, the number of units of production is only 373, employing 13,563 workers. The Garment Exporters Association places the figure at 100,000 workers, of whom 25 per cent are deemed to be women. But recent research reveals that even this latter figure is a gross underestimate, as it does not take into account the large number of home-based women workers active in the industry.[21]

Researchers understandably consider a figure of 8 million home-based workers, as enumerated in the 1981 provisional Census of India, as only the tip of the iceberg: according to Indian Government labour statistics, the women workers engaged in beedi (cigarette) rolling alone are 2.25 million. The engagement of women workers in the informal sector of manufacturing activities is notably widespread in Latin America and Africa; the relative importance of the informal sector is even greater in these two continents than in Asia, and its importance is growing as women resort to it as a survival strategy amidst the debt crisis.[22]

A programme for human resource development in this sector has to adopt different approaches from that in the formal sector. The major feature of the workers in the informal sector is their 'invisibility' in official statistics. Often they do not perceive themselves as workers - the casualised forms of employment deprive them of the dignity and privileges that the status of being a worker confers. The lack of assertiveness is most acute among home-based workers, who constitute a large section of piece-rate workers and petty self-employment entrepreneurs in poor countries. Home-based workers, moreover, seldom join trade unions, whose programmes are primarily directed to the interests of workers in the organised sector.

Despite the difficulties, certain successful experiments have been made in developing countries in imparting relevant technical and assertiveness skills to unorganised women workers. The Self Employed Women's Association (SEWA) and Working Women's Forum (WWF) of India are two such examples.[23] Both programmes are based on an integrated plan of development for women that includes the formation of cooperatives for buying and selling and credit facilities, as well as devising training programmes. Both SEWA and WWF are registered trade unions. But the vision of these unions is

different from the traditional ones that mainly represent male workers in the organised sector. In the word of Ela Bhatt of SEWA: 'The purpose of trade unionism is not only for agitation. It is about solidarity and development: 89 per cent of the workers in Ahmedabad are self-employed. If they are excluded from the labour movement, you are cutting off the vast majority of workers, and those who most need protection'.[24] To date, WWF and SEWA have organised 30,000 and 85,000 women workers respectively in their unions, demonstrating that it is possible to give visibility to the hidden workers in the industrial sector. It is urgent that their achievements are critically appraised in order to explore their replicability in Asia and in other parts of the world. Such an evaluation should include:

a) the cultural specificity of these organisations;

b) their dependence on aid from external and internal donor agencies;

c) the role of charismatic women leaders.

There also have been some organisational experiments, as in Sri Lanka's Export Production Villages (EPV), which have the potential of giving visibility and training to women workers of the informal sector. The twin thrusts of the EPV approach are export promotion through

a) the provision of incentives to local entrepreneurs;

b) participation by the traditional village-based, mostly piece-rate, workers of the informal sector.

The approach contrasts with foreign-dominated large-scale production in the Export Processing Zones. 32 EPV are already in operation in Sri Lanka, concentrating on the production and export of agricultural produce as well as of handlooms, woodcrafts, umbrellas and electronic equipment.[25] The system, however, displays the predictable sexual division of labour: a female-dominated workforce and a male-dominated Board of Directors.

The experience of EPV clearly demonstrates that acquiring management skills is of importance if women are to benefit from organisational innovations. There have been a number of books in recent years to devise programmes for leadership and management skills for poor women; there are also manuals now available for training the trainers.[26] The programmes based on the available manuals, however, can only be a starting-point - the cultural diversities of the countries must be taken into account. The objective of the programmes should be to ensure that women producers, whether self-employed or piece-rate workers, gain control over their resources. Only in this way can exploitation and dependency effectively be reduced.

In the past, much attention has been directed towards income generating schemes for women as a panacea for female unemployment. Hence the corresponding programmes have been primarily oriented to lower level skill training, to supplement family income. The concept of entrepreneurship in modern economic forms has not been a feature of these efforts. It has, however, been observed that many women, although motivated to enter the commercial world, could not do so because of their relative isolation from technical and professional expertise. A small entrepreneur invariably needs to maintain efficiency both as a worker and as a manager. Hence a training programme for female entrepreneurship should include technical assistance, identification of new marketing outlets, participation in trade exhibitions and conferences, access to credit and to the dissemination of business information. The Women's Chamber of Industry and Commerce in Sri Lanka and the Indian Council of Women Entrepreneurs have made some efforts in this direction.[27]

2.5 International Factors Affecting Women's Industrial Employment

One has to be cautiously optimistic about the potential of human resource development programmes for women. Much of their success is constrained by the external environment, over which even national governments have little control. The developing regions are particularly vulnerable, as the anti-inflationary or protectionist measures adopted in rich countries affect the export-market of the developing world. In 1988, the sharp fall in equity prices, for example, threatens to weaken economic activity in all OECD countries, including the United States - the largest export market of the developing regions. Since the US accounts for 58 per cent of the total exports of these countries,[28] manufacturing employment there has become particularly sensitive to measures adopted in the US for adjusting its own structural disequilibria in trade and budget deficits. In addition, the growing financial and trade surplus of Japan - $80 billion every year - casts a frightening shadow of recession over the international economy.[29] A sustained progress towards gender equality in the world of paid work, against this background, can be facilitated, to a very large extent, by stronger international cooperation in trade liberalisation, harmonious structural adjustments and control of financial systems. A future expansion in South-South trade will also contribute to a better environment for a programme of gender equality in manufacturing work.

NOTES

CHAPTER 2

1. Training and Retraining of Men and Women Workers in the Metal Trades with Special Reference to Technological Changes, Report III, Metal Trades Committee, 11th session, ILO, Geneva, 1983, p.24
2. Torkel Alfthan, 'Developing skills for technological change: some policy issues', International Labour Review, Vol. 124, Number 5, September-October, 1985, p.518.
3. ibid, p.3.
4. J K Lee, Manpower Aspects of Economic Development: the case of the Republic of Korea, Korea Vocational Training and Management Agency, Seoul, 1983.
5. Swasti Mitter et al, Linked by the Same Thread, pp.81-85.
6. Irving Jaffe, 'The NICs climb up the industrial ladder: challenge and opportunity for the developed countries', The OECD Observer, Number 147, August-September, 1987, p.12.
7. Rachid Tlemcani, State and Revolution in Algeria, 1986, quoted in Mohammed Saad, 'The transfer and the management of new technology: the Algerian Experience', Working Paper, Brighton Business School, 1988 (mimeo).
8. 'Change and continuity in OECD trade in manufacturers with developing countries', The OECD Observer, Number 139, March 1986, p.7.
9. Cited in Training and Retraining: Implications of Technological Change, Report III, Fourth European Regional Conference, ILO, Geneva, 1987, p.18.
10. A study by the National Computing Centre mentioned in 'UK hit by high-tech skills shortage' in Financial Times, 14 August, 1986.
11. Lydia Arossa, 'Software and computer services', The OECD Observer, Number 151, April-May, 1988.

12. Torkel Alfthan, op cit, p.520.

13. M Knod, Jr et al, 'Robotics: challenges for the human resources manager', Business Horizons, March-April, 1984.

14. M Kenny and F Buttel, 'Biotechnology: prospects and dilemmas for third world development' Development and Change, Vol 1, 1985.

15. P Bifani, 'New biotechnologies for food production in developing countries with special reference to Cuba and Mexico' in New Technologies and Development edited by A S Bhalla and Dilmus James, Lynne Reiner Publishers, Boulder/London, 1988.

16. Women at Work, Number 1, ILO, Geneva, 1986, p.39.

17. 'Science and technology - a future for women?', a document prepared for UNESCO by Dr Jan Harding, Centre for Science and Mathematics Education, Chelsea College, University of London, for the Nairobi World Conference (Paris), May 1985.

18. Cynthia Cockburn, Two-Track Training: Sex Inequalities and the YTS, Macmillian Education, 1987, pp.53-54.

19. Women at Work, Number 1, ILO, Geneva, 1986, p.40.

20. SSNCC/WSCC, Statistics on Women in Nepal, 1986.

21. Rukmini Rao and Sahba Husain, 'Invisible hands: women in home-based production in the garment export industry in Delhi', in Andrea Menefee Singh and Anita Kelles Viitanen, (edited) Invisible Hands: Women in Home-based Production, New Delhi, 1987.

22. Contributions from African and Latin American participants in the workshop on Informalisation of Women's Labour, IRENE/EADI, Holland, 1985.

23. Jane Everett and Mira Savara, 'Institutional credit as a strategy towards, self-reliance for petty commodity producers in India: a critical evaluation', in Invisible Hands, 1987.

24. Quoted in Swasti Mitter, Common Fate, Common Bond, p.156.

25. From data made available by the Regional and Country Studies Branch Studies and Research Division of UNIDO, 1988.

26. Tutor's Manual, op cit.

27. Report of the First South Asian Workshop on Imparting Industrial Management Training to Prospective and Practicising Women Entrepreneurs, New Delhi, 21 October, 1986.

28. The OECD Observer, Number 139, March 1986, p.5.

29. 'Highlights from the OECD Economic Outlook: Achieving a sustained reduction of international economic tensions', The OECD Observer, Number 150, February-March, 1988, p.37;
Shoichi Kobayashi, 'Japanese Financial/Trade surplus and global economic imbalance', paper presented at the Society for International Development (SID) 19th World Conference, New Delhi ,25-28 March, 1988.

CHAPTER 3

3.0 TWO ILLUSTRATIVE CASES: THE TEXTILES AND THE ELECTRONICS INDUSTRIES

Two industries feature prominently in any discussion on women and manufacturing employment: textiles and electronics. It is interesting that, despite similarities, the two industries project different images - the textiles and clothing industry is viewed as a 'sunset' and the electronics as a 'sunrise' one, particularly in rich countries. However, with rapid structural adjustments and with the introduction of new technology, production processes and work organisation are changing in a not too dissimilar fashion in both industries. These changes need to be identified clearly in order to formulate women's training programmes for the jobs of the future, whether in these two industries or in others.

3.1 Women in the Textiles and Clothing Industry

3.1.1 Structural Changes

The textiles and clothing industry has been, in the past, an essential promoter of industrial development in developing countries. 'Export-led' growth, in several Asian countries over the last two decades, was often used synonymously with 'textile-led' growth. Yet recent trends in the international textiles and clothing system indicate that in future this industry's contribution to economic development may take a different shape.

Table 14 provides an overview of the changing shares of world export among developed market economies, centrally planned economies, and developing ones. Two subgroups of developing countries are distinguished according to the pace and timing of their entry into the world market of textiles and clothing. The first subgroup is defined as 'Advanced Textile Exporters',

Table 14 : Share of selected country groups in world trade of textile and clothing goods.

(Percentage)

Exports

	1965	1970	1975	1980	1985
Developed Market Economies	82.0	80.3	72.0	66.0	55.8
Advanced Textile Exporters	9.6	12.0	17.3	18.0	21.2
Other Developing Economies	6.8	5.7	7.8	13.4	20.9
Centrally Planned Economies	1.6	2.0	2.9	2.6	2.1

Imports

	1965	1970	1975	1980	1985
Developed Market Economies	70.3	75.6	78.0	77.5	80.1
Advanced Textile Exporters	5.0	7.5	5.3	6.0	8.2
Other Developing Economies	21.5	12.5	11.9	13.1	9.1
Centrally Planned Economies	3.2	4.3	4.7	3.4	2.6

Source: UNIDO Data Base.

and includes those developing countries which have reached a relatively advanced level of income per capita and which have gained during the 70's and 80's a major share in the textiles/clothing import-markets of the United States and/or the European community. These include Hong Kong, the Republic of Korea, Brazil, Mexico, and Yugoslavia. All remaining developing countries have been included in the subgroup 'Other Developing Economies'. As Table 14 shows, 'Advanced Textile Exporters' gained rapidly in shares in the world export market until the mid 1970's. Between 1975 and 1980, they could only marginally improve their international market positions; this is because their exports met protectionist barriers in industrialised countries and growing low-cost competition from poorer developing countries. Between 1975 and 1985, 'the Other Developing Economies' almost tripled their share in the world export markets, from 7.8 per cent in 1975 to 20.9 per cent in 1985. Between 1980 and 1985, there were some market gains for 'Advanced Textile Exporters', but the export growth rates of 'Other Developing Economies', at a staggering 11.7 per cent per annum, far exceeded the growth rate of 4.3 per cent achieved by the 'Advanced Textile Exporters'.

The future of export-led growth for poorer countries, in spite of the recent record, seems less certain in the coming years, because of

a) a fall in the demand for textile products in almost all developed countries;

b) a slowing down of population growth in the developed market economies;

c) an expected rise in trade barriers;

d) the inclusion of cheap-labour countries like Portugal, Greece, and soon probably Turkey, in the EEC.

It appears that internal markets will have to be the main source of growth for the textiles and clothing industry in developing countries in the coming years.

Till now, the employment structure of the textiles and clothing industry has universally been characterised by its having a relatively large share of low-skilled workers. In 1985, even in the Federal Republic of Germany, almost 60 per cent of those employed in textiles were low-skilled or semi-skilled, and the share was even higher for clothing.[1] In all countries, women provide the major workforce in the assembly-line jobs of both sub-sectors; in the Export Processing Zones, women often account for 90 per cent of the total workforce, employed for 'machining' garments for the world market.

The importance of low-skill or semi-skill labour meant that it was cost-effective to produce the textile products - or at least parts of them - in the cheap labour countries. But in the past three or four years the textiles side of the industry has become highly capital-intensive. Consequently, the share of capital in total costs has gained importance, especially in the developing and newly industrialising countries. Cost studies by the International Textiles Manufacturing Federation (ITMF) for Brazil, India and Korea show that in spinning and in weaving the weight of capital costs is three to six times that of labour costs; in Germany and the United States, by contrast, they have equal weights.[2] The rising share of capital costs reduces the price-competitiveness of the less developed countries compared with industrialised countries. Paradoxically, the more the low-cost countries use the latest machinery, the greater becomes their loss in comparative advantages based on cheap labour. On the positive side, it is the application of modern technology which allows low-wage countries to manufacture products of almost identical quality to

those of the industrialised countries. But the quality of products depends on the availability of skilled labour just as much as on the introduction of technology.

3.1.2 Technological Innovations

Future technological progress in the manufacturing of fabrics and yarns significantly alters the quantitative as well as the qualitative demand for labour. It leads, first of all, to the loss of manual jobs. In spinning, for example, the savings in labour, with computer technology, can be as high as 50 per cent. Coupled with that, there will be qualitative changes in the skilled requirements. There is a general agreement in the industry that the demand for unskilled labour will decline and the demand for highly skilled labour will rise. Both trends will reduce women's share in manufacturing employment, unless they are trained for the new skills as rigorously as men.

The impact of new technology will be felt particularly in the following three stages of production:

a) operating;

b) monitoring the machines;

c) repairing and exchanging of spare parts.

Of these three, operating, which is traditionally done by female workers, will experience massive deskilling and become simpler. Monitoring the machines as well as repairing, on the other hand, will become more complex, and the required skill level of this part of the workforce will rise. Moreover, the job descriptions will increasingly contain elements which have so far been considered marginal, such as planning, preparing and organi: There will be, in other words, a demand for a functionally flexible workforce - with greater emphasis on job enrichment.[3]

To be part of this 'functionally flexible' workforce, women's training has to go beyond the strict domain of technical knowledge. To join the multi-skilled workforce, training will be necessary in finance, accounting and marketing. An ability to respond quickly to changes in demand will be considered an important skill. This is because, with the aid of computers, it is possible to set new patterns on machines in a fraction of the time it used to take.[4]

The introduction of computer technology has been more uneven in the clothing sub-sector of the textiles industry. By far the most striking innovations in clothing have occurred in the pre-assembly stages: the greatest progress has been made in computer-aided design (CAD) and computer-aided manufacturing (CAM). Computer-aided systems save fabric and help to construct new patterns through special software. They also reduce the firm's reliance on the craft-skills of male cutters and designers.

Important as it may be, the introduction of computer technology in the pre-assembly stages does not affect women's current jobs which are solely concentrated in the machining stages. On the other hand, CAD/CAM potentially opens up, by reducing the importance of craft and physical skills in designing and cutting, a new area of employment for women.

In the assembly stages, where women workers currently predominate, the introduction of computer technology has been mainly in the area of two types of sewing-machines, known as 'dedicated' and 'programmable' machines.

The former are designed to do a specific operation - buttonholing machines are an example. The latter require an operator to programme the machine to carry out a job. Once it is done, the machine can then repeat it.

The advances in the assembly-line operations so far imply a trend towards deskilling of machinists rather than replacement of them. In a recent report of Clo Tech '86 (Apparel International, June 1986) mention is made of a machine which can be programmed to buff pockets to jackets, thus deskilling what must be one of the critical jobs left in clothing manufacture. The employers still need one operator for each sewing machine, but the necessity only to load and to unload a garment onto the machine has led to extremely boring jobs for women.

In other words, the advent of new technology will not of itself bring a promise of rewarding or highly-paid jobs for women in the clothing industry. High technology, when introduced, has improved the performance of sewing machines and has deskilled workers, but the basic operation has remained unaltered for the past 150 years. The limpness of cloth has made total automation dificult to administer.

For a real breakaway from the traditional methods of assembly, the spotlight is now focussed on Japan, where a 100 per cent government funded (Miti) research programme has been underway since 1983. The objective, aided by £60 million in government support, is to devise a flexible automated factory. Similarly the European Commission has given £38 million, under its basic research in industrial technologies programme (BRITE), for projects to achieve 'breakthroughs in a new production technology suitable for products made from flexible materials'. A US research project TC^2, under the auspices of the Textile/Clothing Technology Group Corporation, is also trying to devise ways of automating the stitching of garment parts.[5] The aim of all these is to achieve a computer-integrated manufacturing system, whereby the firms will attain 'a totally flexible system - not just in being able to handle an unstable material like fabric, but a system that can cater for changing styles and

shorter runs'.[6] In spite of the publicity about the current research in this area, the factory without people still remains a dream of the future and may become a possibility in the year 2000 rather than in the coming decade.

3.1.3 Skill Developments: Tasks and Occupations

In the short run, upgrading of women's jobs in the clothing industry will require new opportunities for them in technical and managerial jobs. The new technology, is also changing the nature of management itself. This involves decisions with respect to:

a) implementation of new technology in distribution and warehousing;

b) use of new technology in gauging the market;

c) subcontracting parts of production to outside firms;

d) recruiting appropriate personnel for the new tasks.

The importance of these management decisions is exemplified by the Italian company Benetton. It is the efficient application of new technology that made it possible for Luciano Benetton, the founder of the company, to raise fashion from the artisanal to the industrial level.[7]

A key question is to assess the desirability of adopting the current technical innovations in developing countries. Technological innovations of major machinery manufacuturers have been closely linked to the needs of the market and the factor costs of industrialised countries. Innovations in textiles and clothing have not been focussed on the specific needs and relative factor endowments of developing countries. Not much research has been devoted to elaborating 'intermediate technologies' that correspond to the specific needs of developing countries. In this context, exploring the potential of 'human-centred technology', as it has been in the context of the clothing industry in West Germany, is worth considering.[8] This

approach aims to enhance the existing skill of a worker with the help of improved technology, rather than to deskill or replace her.

Training in design management can be an important part of such a 'human-centred technology'. Through it, women workers, both in developed and developing regions, will be able to contribute to their country's striving towards international competitiveness. One of the 'manmade' comparative advantages of the developing countries may lie in this specific area. In the age of 'fast fashion', the traditional designs of developing countries, if used with business acumen, may help them to gain a greater share of the world market. To this end, centres of design management and women's participation in these can play a signifcant role. This is particularly important as the lack of skilled designers is proving to be a bottleneck in many developing countries.

3.1.4 Redesigning the Workplace

The new technology changes not only the skill requirement but also the design of the workplace. The use of computer-aided machines, in the absence of counter measures, leads to new types of stress at work, thus reducing the quality of women's current and future employment. In the textiles industry, the trend is now to organise work in such a way that one worker has to monitor a larger number of machines, giving her/him greater responsibility and more mental work. It can often lead to increased psychological stress. On the operating side, where women are usually employed, the trend is now to make work more repetitive. This often leads to Repetitive Strain Injuries (RSI). The most common form that these injuries take is tenosynivitis.

Tenosynivitis is now getting an increased amount of attention. The causes of this disorder are:

excessive work rates;

rapid repetitive movements;

inadequate rest breaks;

inadequate training in the use of equipment;

monitoring work by machines;

awkward working postures;

poor workplace, tool and equipment design;

lack of job variation;

the process line being speeded up;

compulsory overtime;

vibration;

lack of control over the work process;

a knock or blow to vulnerable areas such as wrists or elbows.

Redesigning the workplace and reducing the work stress has to be the essential part of management training in this industry if women are to benefit from the new technology.[9]

3.1.5 Women in Management

The representation of women in management is sadly lacking in this industry. This is an industry where most women are employed in any positions except managerial and technical ones. A survey carried out in the United Kingdom by the Clothing and Allied Products Industry Training Board in 1978 found that 80 per cent of line supervisors were women and that 80 per cent of higher level managers were men.[10]

The large proportion of women operatives in the textiles and clothing industry strongly suggests that career development policies should strive to increase their numbers in other than operative functions. There is little evidence, however, that this is happening, with the exception

perhaps of women rising to the position of line supervisor. On the other hand, the emerging field of fashion and design management is still relatively free of gender-stereotyping and hence opens up a new area for women. A national design and fashion centre, as an essential part of a country's restructuring programme, can therefore facilitate women's prospects for managerial jobs in the industry.

3.2 Women in the Electronic and Electronics-Related Industries

3.2.1 Structural Changes

The electronics and electronics-related industries cover a wide range of manufacturing products, but it is only in certain segments of this industry and in specific operations that women find employment. Nonetheless, over the years, it has become one of the major new sources of employment for women workers in the manufacturing sector. Hence an analysis of the impact of the current restructuring and technological innovation deserves special attention.

There are four major segments in the industry:

Semi-conductors;

Software;

Computer and telecommunication systems;

Consumer electronics goods and other applications.

However, it is in the semi-conductor and consumer electronics goods that the female workforce is primarily employed, and there too only in the unskilled assembly-line jobs. The knowledge-based and high-technology occupations in the electronics industry are still entirely male preserves.

Semi-conductors lie at the heart of the production of all electronic-related goods. There are three categories of semi-conducting devices:

Discrete components such as transistors and diodes;

Integrated circuits (IC's);

Special purpose devices and circuits.

It is in the context of production of integrated circuits in the global assembly line that women's employment in the electronics industry has received most attention.

Production of semi-conductors is dominated by Japan and the United States. Both countries are net producers of semi-conductors. The United States produces nearly two thirds and consumes about one half of world production. Japan produces more than one quarter and consumes less than one quarter. Western Europe and the rest of the world are net consumers of semi-conductors. Western Europe consumes about one fifth of the total production, but produces less than half of the amount. The rest of the world consumes less than 10 per cent and produces about 2 per cent of the total world production. The production of semi-conductors in the export-processing zones of Asian countries or in the maquiladoras of Mexico primarily represent offshore facilities of foreign companies almost solely from the United States. In fact, the United States imported $4 billion worth of semi-conductors in 1982, of which $3 billion was from four Asian countries: Malaysia, the Philippines, the Republic of Korea and Singapore.[11]

Although semi-conductors are critical components of electronics systems, they constitute a relatively small fraction of total equipment and systems cost. Telecommunications equipment, for example, had sales in 1984 of

about $59 billion, whereas the value of the semi-conductors used in this equipment is approximately only $4.5 billion. The total world market of electronic equipment is currently more than $400 billion and is growing rapidly. The anticipated high growth rates in data processing, office equipment and software are particularly noteworthy.[12]

Despite this expanding market, only a handful of developing countries have made an entry into the electronics equipment industries: Taiwan, Hong Kong, Singapore and the Republic of Korea together account for 80 per cent of all electronics equipment exports for the less developed countries.[13] Initially the indigenous firms - some of them subcontractors of US, European and Japanese companies - entered the industry by producing the simple products that were at the mature stage of the industry life cycles. They consisted of simple consumer products such as radios, black-and-white television sets, and audio equipment. The technology for these products was easily obtainable and was changing slowly, so that there were low technological barriers to entry. The firms competed on price, using their extremely low labour costs. Later, as the firms' technical capabilities improved through learning the simple technologies, they developed the capability to imitate foreign technologies and to modify the technologies imported through licensing. They were gradually able to move to more complex consumer products such as colour televisions and cassette players. The larger firms began to develop their own international marketing capabilities, which helped to overcome some of the major problems of peripheral location by feeding back information on market and technology developments to the home country.

The industry has grown dramatically in the Asian NIC countries; in the Republic of Korea, for example, employment grew from 30,000 in 1970 to 250,000, or 13 per cent of the workforce, in manufacturing in 1983. In

order to counteract the threats of competition from countries with even cheaper female labour such as the Philippines and Sri Lanka, the Asian NICs gradually moved to products that are at a more advanced stage of the industrial life-cycle. These are the products where the technological barriers to entry in particular are high, such as colour televisions, video cassette recorders, instruments, telecommunications and computer-related products.

In contrast, Latin American countries such as Mexico, Brazil, and Venezuela have an indigenous electronics industry which is at a relatively early stage of development. Mexico has an electronics sector that is large but uncompetitive in the consumer goods subsector. Very recently, it has also taken positive steps to attract foreign investment in the non-consumer goods electronics sector.

In South Asia, the electronic industries are, for the most part, based on simple consumer products such as radios, television sets and tape recorders produced mainly to reduce import reliance. In recent years, a more diversified sector has grown in India involving computers, communication equipment, process control equipment and other instruments. Very recently, India has started production of small volumes of ICs. Technology levels, in general, lag significantly behind the world state-of-the-art and rates of indigenous innovation are low.

3.2.2 Technological Innovations and Women's Employment

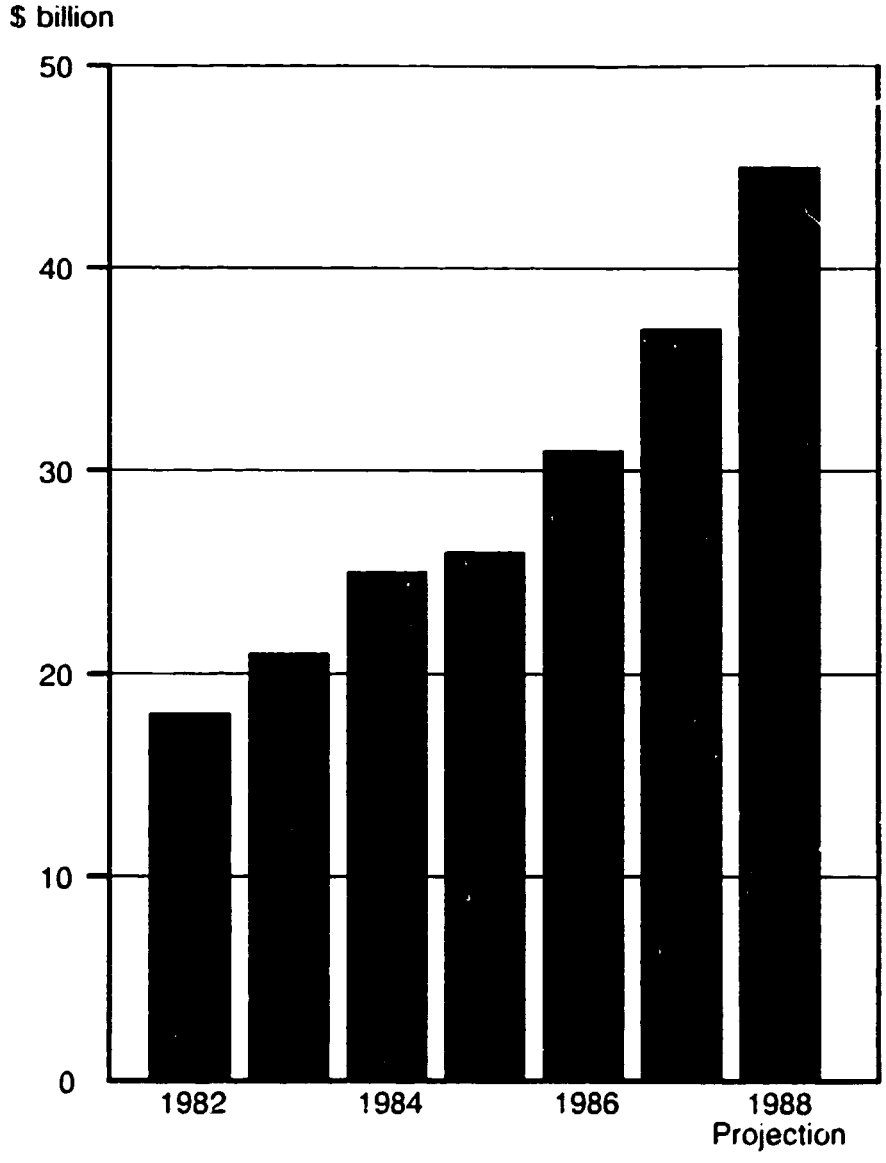
The majority of the female workforce in the global electronics industry is in Asia. Total employment in Asia's electronics industry, including Japan and China, exceeded one million in 1983, accounting mostly for skilled, unskilled and clerical workers.[14] In 1978, over 90 per cent of the total electronics workforce in Asia, not including Japan, were unskilled and

semi-skilled 'production operatives', performing manual and semi-automated assembly line jobs and product testing. Over 90 per cent of these operatives were women.[15] However, in 1983, there were indications that in some Asian countries the percentage of male operatives employed in electronics had increased, though only very slightly. The average electronic worker in Asia, in the 1980s, therefore, was 20 years old, female and unmarried. The profile of the US workforce in the industry has some similarities to that in South East Asia. About 60 per cent of the US electronics workforce in 1982 consisted of production and clerical workers. Nearly one quarter were semi-skilled operatives, of whom 69 per cent were women. Over half of the operatives in the US at the time were non-white, principally Hispanic (mostly of Mexican origin), Filipina and Indochinese. Most of the engineers, programmers and managers were white males.

The continuing employment prospect for women in the industry depends on a number of factors. From a purely quantitative point of view, women's jobs depend on the demand for electronic goods and the consequent demand for semi-conductors. Apart from cyclical fluctuations, the demand for electronic goods and hence of semi-conductors is set to rise for the coming years. Booming sales of computers and computer workstations and other electronic goods have already produced a worldwide shortage of computer memory chips. Between 1982 and 1988, as Chart 4 shows, the sales for semi-conductors have more than doubled, and unless supply can be increased, the chip shortage will dampen the growth of the entire electronics industry.[16]

The steady increase in the demand for microchips, however, does not necessarily assure women's share of employment in the industry, particularly in developing regions. There has already been trends towards relocating some of the assembling operations back North. A number of

CHART 4: SEMICONDUCTOR MARKET



Source: Dataquest

transnational corporations are now increasingly investing more in regions like Scotland or Ireland, where the unemployment rate is very high and where national governments are willing to give subsidies to attract foreign companies.[17]

Apart from the freedom from tariff barriers and ease of access to major markets, there are technical advantages to be gained from locating assembling operators in Europe.

Until recently, this type of work was carried out in two stages. Assembly and initial test work was often sent to the Far East where labour costs were low and the necessary manual dexterity and visual orientation skills could be bought cheaply. Final tests were done in the semi-conductor company's parent company (often in the US) where the necessary expensive equipment could be used. Recently, there has been a trend to locate integrated plants in the developed world, where both the assembly and final tests can be done. While progress is being made with assembly robotics, automatic chip-packaging is still some way off, and the trend towards greater on-chip integration means that chip assembly is likely to be a relatively stable or even a growing source of employment within industry[18] but not necessarily in the cheap labour countries of Asia. With the increased trend towards high memory and customised chips, quality rather than pure labour costs is becoming the criterion for industrial location.

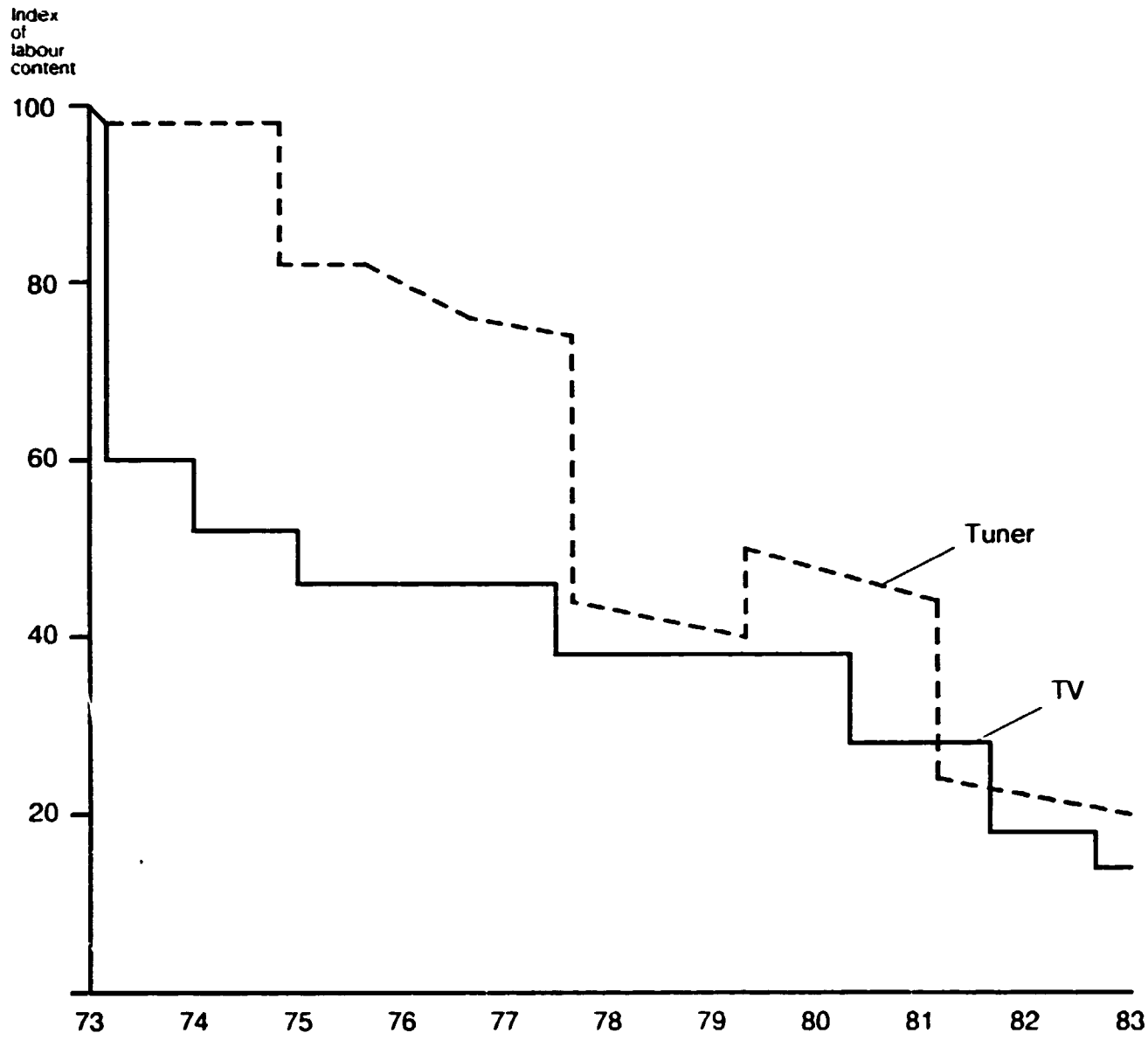
In the consumer electronic goods too, the female employment is likely to fall because automatic insertion is becoming widely popular in assembly operations. This has been possible because of a significant and continuing decline in the number of components involved by redesigning the production process. Data from work on the colour television industry in the 1970's

illustrates this point. The first colour television sets incorporated a valve-based chassis and contained something like 1,400 components. Transistorisation followed by the use of integrated circuitry, reducing the component count to only about 200 by the late 1980's. This reduction in components and the introduction of automatic component insertion machinery led to rapid decreases in the amount of labour required, vast improvements in quality and a drastic shortening in the labour hours needed to assemble a set.[19] While it took ten hours to assemble a colour television in 1970, the same job can be done now in less than two hours.

The trends in labour inputs are illustrated in Chart 5. In fact, labour costs now represent not more than 10 per cent of the ex-factory costs of all consumer electronic goods. In the case of 14" colour television sets, labour costs now account for as little as 5 per cent of ex-factory costs. Differentials in the labour costs are therefore becoming relatively less important in determining decisions on where to locate assembling plants.[20]

The relocation back to the developed regions is also facilitated by the steady introduction of the 'Just-in-time' system of inventory control. Because electronic companies produce a variety of products in small batches everyday, rather than assemble products in large batches for a set period of time, it is cost-effective if component supplies match the manufacturing requirements each day. This allows firms to be more responsive to market demand and enables a more uniform flow of production to be achieved. Also, the need to hold a vast and expensive storing capacity is drastically reduced. To make the stragegy successful, suppliers of components are required to deliver smaller, more frequent batches of materials on a 'Just-in-time' basis and to synchronise their production sequence to match the assembly plant's work schedule. This 'fine tuning' is possible only if

CHART 5: TREND IN THE LABOUR CONTENT FOR CONSUMER ELECTRONICS GOODS



Source: Based on Booz, Allen and Hamilton

the assembling firm can rely on an efficient and reliant network of local subcontractors. Reliance on off-shore suppliers proves to be far less effective.

3.2.3 Skill Developments for Women: Tasks and Occupations

Against the background of these technological innovations it is possible to indicate the changes in skill requirements that will be required of the workers in this industry in the future. Women's access to employment in this sector will depend on acquiring the relevant skills. While the importance of labour inputs is declining in the electronics industry, the need for expertise is rising in the following areas:

component integration;

design for manufacture;

flexible automation;

managerial innovations.

The variety of expertise, noted above, represents a combination of technical and managerial skills. The occupational breakdown of employment in the electronics industry in the UK between 1978 and 1984 shows that there have been steady increases in managerial, technical, technological and scientific employment, and decreases in artisanal and operative.[21] The UK's experience is representative of the industry in general. While it is discernible that the trend is towards an increased demand for multi-skilled workers in the field of science, technology, design and management, there is little evidence of women making entry into any of these fields. Table 15 shows that even in the developed regions of the world, the occupational breakdown in the electronics industry displays characteristics similar to that in Far Eastern countries of Asia. In Ireland, as in Asia and elsewhere, women's representation in the managerial and technological occupations is extremely low.

Table 15: A typical example of European peripheral regions: gender composition of electronics workforce in Ireland in 1981

Occupation Group	Employee	Per cent	Females	Per cent Female in each group
Managers	725	6.4	32	4.4
Supervisors	581	5.1	141	24.3
Administrative	444	3.9	143	32.2
Professional	607	5.3	45	7.4
Technicians	886	7.8	33	3.7
Clerical	848	7.5	609	71.8
Craftsmen	348	3.1	4	1.2
Non-craft production workers	6,527	57.4	4,695	71.9
Others	372	3.2	93	25.0
Total	11,338		5,795	(51.1)

Source: Graham Day (ed), Diversity and Decomposition In The Labour Market, UK: Gower, 1982, p. 186.

In the age of 'man-made' comparative advantages, this exclusion of women from occupations that need cognitive skills is wasteful as far as an effective use of human resources is concerned. The consequences are particularly important for the developing countries that are attempting to build a strong indigenous base in computer technology. The Republic of Korea, for example, is now running into a major problem in expanding its electronics industry. Foreign firms are refusing to license the relevant technology, since they do not want to encourage direct competition from Taiwan and the Republic of Korea in products they are still producing themselves. This has forced the Far Eastern firms to do their own R & D work - a difficult task since the technologies concerned are changing rapidly.[22] It also requires a large pool of scarce expertise, which could be developed only by exploiting the latent skills of female and male workers.

The need to emulate the capital-intensive methods of production of the developed regions may not be so urgent in the current stage of the electronics industry in India; the production there is geared to the national market and the indigenous industry receives tariff protection. But even so, creating a larger pool of technical and managerial expertise will be of the utmost importance if a developing country such as India is to move to the next phase of information technology. A broad-based expertise in the area, drawing upon female and male scientists, will be extremely useful for devising an 'appropriate information technology' from different vintages of software and hardware currently available in the world market.

In spite of the potential contribution that women can make, there is little evidence so far of their advancement in the electronics industry. Even the numerical gains they enjoyed for a while seemed transitory. In Japan, between 1973 and 1983, the semi-conductor industry has changed from a predominantly female industry to a heavily male one. Similar patterns are being observed in West Germany and the UK.[23] In other words, women's employment prospects in this specific sector of manufacturing industries are extremely limited, unless women are actively encouraged and assisted to be part of the new breed of elite and multi-skilled workers.

NOTES

CHAPTER 3

1. U Adler and M, Breitenacher, 'The impact on women of the introduction of new technologies in the textiles and clothing industry', a background paper for a series of country-level analyses of the changing role of women in the textile and clothing industry of selected Asian countries, UNIDO, November, 1987 (mimeo).
2. ibid, p.19
3. ibid, p.27
4. 'Britain's high-fibre diet', The Sunday Times, 6 October, 1985.
5. Textile Outlook International, The Economist Intelligence Unit, September 1986, pp.63-64.
6. Mike Drury of Courtaulds, quoted in Apparel International, March, 1986.
7. Fiorenza Belussi, 'The impact of information technology on the clothing industry: A preliminary investigation on the Italian case with special reference to Benetton', paper presented at the workshop on Information Technology and the Clothing Industry, Brighton Polytechnic, 26-28 February, 1988.
8. H J Braczyk, Christa Gebbert, and J H Knesebeck, 'Neue Transporttechnologien in der Bekleidungsindustrie, VDI Verlag, 1986; Exploiting the potential of human-centred technology around sewing machines is being undertaken by H J Braczyk and Christa Gebbert in Arbeitsgruppe fur sozialwissenschaftliche Industrieforschung (ASIF) GmbH, Bielefeld, West Germany.

   Some results have been documented in Christa Gebbert, 'Application of technology and working conditions in the German Clothing Industry', paper presented at the workshop on Information Technology and the Clothing Industry, Brighton Polytechnic, 26-28 February, 1988.

9. Joan Keating and Carole Truman, Stress and Job Design in the Clothing Industry, Report produced from Women at Work Unit, UMIST, Manchester, UK, 1986, p.26.

10. 'The aspirations of female shopfloor workers', Clothing and Allied Products Industry Training Board, Leeds, UK, 1979.

11. Sean Eamon Lalor, 'Overview of microelectronics industry in selected developing countries', Industry and Development, Number 16, UNIDO, Vienna, 1986, p.29.

12. ibid, p.29

13. ibid, p.49

14. Thomas Gassert, Health Hazards in Electronics: A Handbook, Asia Monitor Resource Centre, Hong Kong, p.54.

15. ibid

16. 'World-wide shortage of computer memory chips hits manufacturers', The Financial Times, 18 February,1988.

17. Swasti Mitter, Common Fate, Common Bond, Chapter 3, Section 1.

18. Erik Arnold, John Bessant and Peter Senker, Science and Technology Manpower in the Electronics Sector: Skill Implications of Technological Change, Science Policy Research Unit, University of Sussex, UK, August 1985, p.58-70.

19. Thanassis Chrissafis 'Technological changes in consumer electronics goods: implications for corporate strategies', School of European Studies, Sussex University, UK, 1988 (mimeo);
Erik Arnold, Competition and Technological Change in the Television Industry, Macmillan, London, 1985.

20. Simon Milne, 'New forms of manufacturing and their spatial implications: the UK consumer electronics industry'; paper presented at the European conference on Applications of New Technologies in Established Industries - Prospects for Regional Industrial Regeneration and Employment in Europe, CURDS, University of Newcastle, UK, 23-25 March, 1988.

21. Erik Arnold, John Bessant and Peter Sender, op cit. p.13.

22. Sean Eamon Lalor, op cit, p.50

23. I Lenz, Frauenarbeits-Futurismus-Tango, in: Beitrage zur feministischen Theorie und Praxis 9/10, Zukunft der Frauenarbeit, S. 1983.

    Kevin Morgan and Andrew Sayer, The International Electronics Industry and Regional Development in Britain, Urban and Regional Studies, University of Sussex, working paper number 34, 1983.

CHAPTER 4

4.0 POLICIES AND STRATEGIES

4.1 Priorities in Planning: Short and Long Term

The next decade is likely to experience certain pronounced changes in the pattern of women's participation in the industrial sector.

In the short-term, the food processing, the chemical industries as well as the textiles and clothing and the electronics industry will still be significant employers of the female workers. But here too women's prospect of maintaining even their present share of jobs will involve upgrading their present skills. Identification of skill requirement in these two industries, therefore, ought to be the focal point of a human resource development programme in countries with a sizeable industrial sector.

In the medium and long term, only upgrading women's present skills will be counterproductive: the advances in information technology and biotechnology are going to make many feminised assembly line jobs redundant. The only way women will maintain or augment their share of employment in these sectors, therefore, will be by acquiring new skills in the fields of science, technology and management. This programme for gender equality has to include a demand for resources for imparting these relevant skills to women workers. This is important, as women traditionally are not encouraged to take up these subjects, which are viewed as training for 'male' jobs.

Information technology also opens up new possibilities of careers for women in manufacturing. Computer-aided machines increasingly reduce the need for assembly-line unskilled work; but they also erode the industry's reliance on craft-based skills and physical strength. In the printing industry, for example, the use of computers in place of compositors, has allowed women to

have entry into occupations that were generally closed to them before. Even if new opportunities arise, it will be difficult for women to demand and receive a greater share of jobs in industrial sectors unless measures are taken to alter the gender stereotyping of occupations and workers. Similarly, in the absence of social provisions for childcare and care for the elderly, it will be dificult to convince the employers that women can constitute an equally valid labour force for responsible and senior managerial jobs.

Any programme for human resource development should also take note of the fact that a large number of women industrial workers are employed in the informal sector. These workers are often, as we noted, invisible to official statistics, and are difficult to reach. Any programme for their advancement in the field of paid work has, therefore, to link up with the ongoing efforts of grassroots organisations. The experiences of such organisations ought to be critically evaluated with a view to replicating them in a different social and cultural milieu.

It is also relevant to stress the role of technology appropriate to the informal sector rather than mere modification from the formal sector. In view of the high rate of unemployment and underemployment in the developing (and also in pockets of the developed) world, human-centred technology now deserves special attention. In the context of women's employment, the approach should be to identify the skill and expertise women currently practice in their craft-based units and to explore the scope of new technology in enhancing rather than replacing these.

The growing phenomenon of subcontracting has also given rise to small-scale units and home-based work, in the developed as well as in the developing world. It is important to recognise that this side of the unorganised

sector is not parallel to the market economy, but contributes to it. One way of empowering women in this sector will be to give them access to credit and to marketing skills so that they can set up on their own, as small-scale entrepreneurs, from a position of stronger bargaining power.

4.2 Future Areas for Action

The role of government, in the context of enhancing women's positions, should be to:

- implement a legislative framework for achieving gender equality;
- provide adequate social care for facilitating women's entry into manufacturing jobs;
- subsidising and formulating programmes for women's training in the field of sciences, technology and management;
- monitor carefully the impact of each macro-economic measure on women's employment.

The role of education and training centres should be to devise curricula that will:

- change the gender stereotyping in the choice of subject;
- encourage women to take up training in new skills;
- instil confidence and competence among women for self employment and multiskilled jobs;
- steer women towards the new and challenging areas of employment;
- encourage researchers to formulate appropriate and human-centred technology based on women's skills and needs.

The industry can contribute to the programme of equality at work by:

- making those responsible for recruitment aware of women's potential contributions;

encouraging firms to employ more women in senior positions for providing 'role models';

providing creche and childcare facilities at the place of work;

monitoring sexual discrimination and sexual harassment at work.

The non-government organisations and donor agencies should take action by:

channelling resources to strengthen the grassroots organisations of women industrial workers;

encouraging participatory action research for identifying the training needs of women workers - in the short and in the long run;

raising awareness of the important role women industrial workers play with regard to a country's wealth creation;

emphasising the link between women's employment and the quality of human capital.

A coherent programme for achieving quantitative and qualitative improvement for women's employment in manufacturing and in other fields will require direct participation of women themselves at all levels. Hence, increased representation of women in the decision-making processes of governmental, non-governmental and educational agencies will be a necessary precondition for enhancing women's opportunities in the industrial sector. Women's organisations should not relent in demanding such representation, either in the developed or in the developing world.