Making Women's Voices Heard:
Technological Change and Women's Employment
with Special Reference to Malaysia

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Editor's Note

With pleasure we present to our readers the special series of UNU/INTECH Discussion Papers: Information Revolution and Policy Implications for Developing Countries. Papers of the Series were originally developed for the International Workshop on The Information Revolution and Economic and Social Exclusion in Developing Countries, held in Maastricht on 23 -25 October 1996. The Workshop was an important event organized by UNU/INTECH and financed by the Dutch Government. Insights developed from the Workshop have not only been benefiting UNU/INTECH research work, but also contributing to many other initiatives in the area of innovation policy for information technology in developing countries.

There are six papers in the special series. The first five papers have been widely circulated and are provided here in the latest modified versions. These are outcomes from the two major themes set for the Workshop: ‘The Developments of Access and Effective Use of Information Technology and Exclusion’, and ‘The Gender Dimension in Exclusion’. The sixth paper, by Ludovico Alcorta, is a summary of the three country cases on Burkina Faso, South Africa and Tanzania organized for the Workshop.


#2002-2* Constantine Vaitsos, “Policy Agenda for the Information Revolution and Exclusion Phenomena in Developing Countries”


#2002-4* Carlos M. Correa, “Implications of Intellectual Property Rights for the Access to and Use of Information Technologies in Developing Countries

#2002-5* Cecilia Ng Choon Sim, “Making Women’s Voices Heard: Technological Change and Women’s Employment with Special Reference to Malaysia”

#2002-6* Ludovico Alcorta, “The Information Revolution and Economic and Social Exclusion: The Experiences of Burkina Faso, South Africa and Tanzania”

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MAKING WOMEN'S VOICES HEARD: TECHNOLOGICAL CHANGE AND WOMEN'S EMPLOYMENT WITH SPECIAL REFERENCE TO MALAYSIA

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1. THE PROJECT

In 1994 the United Nations University Institute for New Technologies (UNU/INTECH) launched a major research project on technological change and women's employment in eight countries in Asia. But this was no ordinary academic research involving scholars undertaking studies in their respective fields of expertise. Indeed this was a project with a deliberate difference. From the very beginning it was meant to be innovative, participatory and exploratory, particularly from the perspective of the millions of women workers (and the organisations which represent them) who would be affected by the rapid spread of technology in their work and lives. In addition the project also wanted to elicit the responses of policy makers whose policies would have widespread implications on female employment in the region.

However one of the stumbling blocks was that these two groups, for the most part, seldom met to discuss, nor did many see eye to eye with each other. To a large extent it was felt that technology was not an important factor to be debated since developing countries heartily welcomed it as THE panacea to poverty and underdevelopment, while many non-governmental organisations perceived technology to be a threat i.e. taking jobs and incomes away from people. Yet the fact remains that the pervasive use of new technologies today is having a profound impact on the process and organisation of production, transforming the role of women in the industrial as well as the service sectors. Nonetheless there is little empirical work done to conclude whether technology liberates or oppresses society.

The impact of new technologies on the quality and quantity of women's work is a complex issue. Automation and robotic technologies have replaced women's work in labour-intensive, assembly-line work. Yet information technology has also created new types of employment for women, particularly in the services sector. New technologies have also led to the decentralisation and externalisation of work. While this implicit flexibility in working hours could be welcomed by women, it could also cause potential health hazards, if left unchecked.

It is against this background that the INTECH project was formulated - to ensure that women who bear the consequences of technological and industrial policies should have an adequate voice concerning their formulation, implementation and evaluation. With the objective of improving the advocacy skills of women workers' organisations by providing them access to
key knowledge on new technologies and work, the project strove to initiate a dialogue between their representatives and relevant policy-makers so that women workers would benefit as a result of technological change. In this way it was hoped that women would not be excluded by the process of technological advances.

This paper examines the above project and draws on the learning experiences of Malaysia - one of the country partners - representing the newly industrialising countries (NIC). It will look at the mode of research and interaction, briefly summarise the major findings from the NGO case studies, and discuss at length the Malaysian experience.
2. THE PROCESS

A series of key interactive activities marked the different stages of the two and a half year project. Initially the project team visited the various countries which were chosen to reflect the wide variety in the Asian region in terms of size, state of industrialisation and market orientation. Several women workers' organisations, trade unions, research bodies and relevant government agencies were consulted regarding their participation in the project. Finally the project team obtained the cooperation of 26 and 18 key non-governmental organisations (NGOs) and policy bodies respectively to be partners in this project.

In September 1994 the first workshop was held in Kuala Lumpur bringing together the 26 representatives from women workers' organisations, trade unions and research bodies to initiate a process of developing strategies to ensure that women are positively rather than negatively affected by technological change. Since knowledge is an important component in formulating strategies, the NGOs embarked on their own case studies in the industrial and services sectors where large numbers of women were being employed. In the following year these same representatives met at the national level to share their findings with other groups, formulate relevant policy recommendations and work out negotiating strategies to voice their concerns to their respective governments.

In the meantime in March 1995, the second workshop was held with senior policy makers who shared information about existing industrial and technological policies in their respective countries. The INTECH project team also shared the concerns and recommendations from the Kuala Lumpur workshop and possible policy changes were discussed in the light of the problems faced by women workers.

Finally in March 1996, the NGO representatives and policy makers met in Bangkok whereby they went through a process of dialogue and negotiation - the NGOs presenting their country proposals and the policy makers responding to their concerns. In most cases, dialogue was constructive and plans were made to continue this collaboration both at the regional and country level. As a result of these intense discussions, NGOs and policy-makers felt a need to have a certain level of cooperation particularly in the present context of globalisation and liberalisation where the private sector was playing an ever more important role in the world economy. Both
parties felt that new regulatory mechanisms needed to be formulated to protect employees under the changing global scenario.

To a large extent this collaboration was necessitated by the findings of the NGOs which contributed critical knowledge to what was happening on the ground - information needed by policy makers who wished to formulate policies to protect women workers affected by technological change. Promises of productivity increase, a better quality and democratisation of work and life as a consequence of the introduction of new technologies are not without their pitfalls. However different countries experienced different problems depending on their level of economic restructuring and development, the nature of the technological process, the negotiating power of their workers as well as the ability of governments to initiate policies beneficial to women workers.

Based on their case studies, the NGOs were concerned that the information revolution would threaten less developed, poorer countries which cannot leap-frog - thus widening the gap between the "haves" and have-nots". Poorer nations which are completely left out of the Internet map for example, will be left further behind due to unfair competitive positions and unequitable access capabilities.iii Moreover two types of groups will appear - a minority which will secure employment with good career paths and the majority, including women, who will be socially excluded from this process and thrown into increasingly casualised employment.

Another important finding was that the new technologies accompanying globalisation are reorganising production processes all over the world with wide-ranging employment implications. Globalisation also means the increasing control of MNCs of production and markets, increasingly dependent on innovations in computerisation and telecommunications (telematics). The growth of new services markets propelled by globalisation and IT include banking, construction, accounting, advertising, management, data processing, software production and insurance. Telework and teletrade point out to future directions in the changing pattern of employment, both nationally and internationally.

The descent of new technologies is also effecting profound changes in women's work. The case studies confirm the insights provided by Mitter (Ng and Kwa, 1995:67), in that employment is being transformed in three major ways:
1. By altering the process of production in manufacturing and service industries through:
   * automation;
   * de-skilling of workers;
   * augmenting the skills requirements of key jobs;

2. By introducing "new" products or services in the market, such as electronics, computer peripherals or information processing work; and

3. By shifting production - that often uses 'old' technologies to locations that are distant from the main sites of commercial units or to home-based workers.

The shift to a more knowledge-based production has not impacted uniformly on women nor on men. Some have gained while others have lost. New jobs have been created for women but others face vulnerable forms of employment. Women have found employment especially in the growing services sectors (e.g. Vietnam and Malaysia) and have even developed hi-tech homeworking as in the case of Korean professionals in the publishing industry. At the same time thousands of Korean women have been retrenched as a result of automation and downsizing in the light industrial sector. Many of these are older women who do not have the skills to enter the new technology multi-skilled jobs. There is also a trend towards production decentralisation, subcontracting and the development of small scale industry, where flexible work is the rule rather than the exception as in the South Asian examples.

Thus the fears of women workers are real; these include technological redundancies, flexibility and the casualisation of labour, concentration of women in low-skilled jobs and in the small and unorganised sector as well as the health and safety hazards associated with new technology, such as computerization. Where before women workers had protection in the socialist countries, the opening up of the market to foreign capital has led to a loss of these rights and increased health hazards. Yet if there were sufficient mechanisms, some of these rights could be maintained (e.g. China).
3. MALAYSIA'S LEARNING EXPERIENCE

Industrialisation and Technological Change in Malaysia

Suffice to say that Malaysia's economic development over the past decade has posted growth rates which is the envy of most industrialised economies. Today Malaysia is the nineteenth largest trading nation and is ranked seventeenth in competitiveness in the world (Mohamed Jawhar, 1994). The present buoyant economy is based on a liberal industrialisation policy which aims to fully integrate the country into the global economy. The fact that Malaysia is the third largest recipient of FDI (foreign direct investment) flows in Asia, after China and Singapore has ensured rapid economic growth second to none in the region. To quote the Sixth Malaysia Plan,

- "This new approach to industrialisation will emphasise the development of export-oriented, high-value added, high technology industries...the objective of the industrial policy is to move towards capital-intensive and technologically sophisticated industries producing better quality and competitive products that are integrated with the markets of the developed countries...and in the long run, industrial development will emphasise greater automation and other labour-saving production processes to reduce labour utilisation" (6MP, 1991-1995, pp. 137-139).

Nonetheless, despite impressive growth performances in manufactured exports, several weaknesses remain. These include a very high concentration and hence reliance on a few products in the export market, the domination by multinational corporations (MNCs) of these exports, particularly of electrical and electronic goods and the low local content of these exports. In addition there is little R&D undertaken by both local and foreign firms and in terms of marketing, it was found that Malaysian exporters depended on parent companies or foreign buyers for their products. Technological transfer from the developed countries to Malaysia has also been found wanting (UNDP, 1994).  

Notwithstanding these weaknesses, industrial policies have had a significant impact on the employment and educational opportunities of Malaysian women. The labour force participation rate for women increased to 47 percent in 1993; and although the majority of women are still at
the bottom of the occupational hierarchy, the composition of the female labour force is changing. Women are increasingly entering the urban economy as production and white-collar workers in the manufacturing, sales and services sectors.

With the increased educational levels of younger women, there is a distinct shift of more women entering white collar employment. The labour force participation rate of women in the 20-24 age group was 62 percent in 1993 while those with college and university education was 72 percent (Nagaraj, 1995; Jamilah, 1994). This trend reflects the expanding opportunities for female graduates in the expanding information technology (IT) related sectors of banking, insurance and telecommunications (Ng and Yong, 1995).

However these new technology jobs have also become differentiated between 'high-skilled' and 'low-skilled' work, that is between computer analysts and the like in the professional and technical category and the data processing workers on the other end of the technology spectrum. The majority of computer-related jobs, which are predominantly held by women, are still in the direct and indirect low-skilled categories.

The entry of women into new technology jobs has been facilitated by the educational system. Indeed, academic programmes offered by tertiary institutions in the area of computing, information technology and related fields have grown largely because of national policies which have encouraged their development. It has been an encouraging sign that women have shown great interest and inclination in this new field of information technology - much more compared to women in western countries.

For the 1990-1991 academic year, women comprised 51.4 percent of total enrolment in the IT field in the seven local universities. The latest count (1993-1995) at Universiti Teknologi Malaysia disclosed that females comprised 42.3 percent of total enrolment in the Computer Science and Information System programme (Maimunah, 1995). The entry of females into tertiary high technology studies has also been greatly helped by the establishment of the Computers in Education Programme which aimed to create computer literacy in schools. It was found that half of the members in these computer clubs were girls.

The following case studies conducted by the Malaysian NGO partners and the author in the services (telecommunications) and manufacturing (electronics) sector provide a deeper insight of the workings of technological change on women's employment at the firm level.
4. MALCOM - A TELECOMMUNICATIONS COMPANY

The telecommunications company (MALCOM) was in a state of transformation during the period of research in mid-1995. Since the beginning of the year a major organisational restructuring has been taking place. As stated in the 1994 Annual Report (p. 23),

- "The National Telecommunications Policy announced in May 1994 and, combined with the deeper liberalisation of the market called for new initiatives on our part. We saw the need for a fundamental review of our strategies and organisational competence to engage in competition... and to take charge of the future".

Employment Status

As of December 1994 there were 29,011 employees at MALCOM compared to 28,011 at the end of 1990, and 30,186 a year ago. Females form 26 percent of total staff, the majority of them being telephonists and clerical workers. In terms of ethnicity Malays dominate in all job categories (74 percent). Eighty percent of the employees are less than 40 years old reflecting the recruitment of younger workers, particularly at the executive level, as older workers at the manual category retire off without being replaced.

There has been a decrease in total staff of nearly 1,000 employees despite the rapid expansion of its services, network and customer base. Labour productivity on the other hand has grown as lines per employee increased from 15.6 in 1980 to 40.0 in 1987 and to 97.0 at the end of 1994. As noted by the Executive Director in 1991 "the most remarkable thing about the organisation is how it has been able to achieve and manage growth without practically any increase in the number of employees". Apparently, the company in current corporate mould, is over-staffed. However no staff can be retrenched as this was the agreement with the union before privatisation could take place.
Tables 1 and 2 reveal changes in the employment pattern in the last five years. Reflecting the trend towards a more computerised workforce, the number of executive and technical staff has doubled while there has been a drastic reduction in the manual and teleprinter categories, with males being the most affected. It is also interesting to note the 100 percent increase in the intake of women as systems programmers and computer operators while the position of typist
has been eliminated. Although the absolute number of telephonists and data-processing operators has decreased, these are still female-dominated categories.

Thus the introduction of computers has led a varied impact on employment pattern. Job losses are experienced by both men and women at the lower levels, while the largest job gains are obtained by men, especially at the technical and executive level. There have not been any radical changes in the gender nor ethnic division of labour revealing that pre-existing divisions of labour still mediate the impact of technology on the employment pattern in this industry. What has changed is a distinct flattening of the occupational hierarchy and the positive recognition of the skill levels (in terms of upgrading) of computer-related jobs.

**Computerisation and the Changing Organisation of Work**

Although MALCOM embarked on computerisation in the early 1970s, it is only in the last 10 years that there has been major upgrading with the development of new systems as well as the integration of existing systems to provide more functions with up-to-date technology. What has been its impact on the organisation of work? The findings of the case study show several trends - a decrease in the number of workers needed and a more efficient work process coupled with a concomitant increase in the intensity of work. At the same time the decentralisation of work has allowed for more autonomy at the lower levels. Let us illustrate by a few examples, mainly from the accounts and international exchange section.

Computers were introduced in this particular Accounts Section of the company in 1990. Prior to that all office work, including the printing of bank cheques, was done manually with the help of type-writers and calculators. According to the Senior Accounts Assistant the advent of computers has eased office work quite substantially making it more efficient; the work of eight persons who were preparing staff payroll is now done by three persons.

Computers have allowed work in this accounts section to save time, to save space and work is more accurate and clear. For example employees' salaries are paid on time compared to delays before. The number of files, ledger-books and paper has been reduced; the computer is also programmed to avoid errors while the printed document is clear and clean compared to the earlier carbon copies which fade over time with different and confusing hand-writing styles.
Another unit visited was the panel doctor unit which before computerisation, had 16 staff who manually processed payments for the medical bills within the Central Region. According to the chief clerk, this was a mammoth task as it entailed manual matching of medical bills between employees and the 400 clinics they visited. Each week 15 staff would sort out more than 400 claims coming from the 5,000 employees in that region with one staff sorting an average of 1,500 bills per person per month. After matching the receipts, vouchers had to be manually written and payments calculated and written. The obvious outcome was delays in payments for as long as six months or more leading to inefficiency, a bad image for the company and poor relations between the company and medical community.

In 1992 a computerised personnel system was introduced throughout the company whereby all relevant information about personnel were keyed in and stored electronically. To the relief of the panel doctor unit, half their problem was solved as machines not only matched bills but could make payments automatically. A considerable amount of time was reduced and together with other changes introduced through the initiative of the chief clerk, additional (and useless) paper work was eventually eliminated. Payment time was then shortened from six to three months and eventually to three weeks when she introduced the auto payment system. Now there are seven staff although the chief clerk points out that she actually needs only four clerks, compared to the 16 before computerisation. She credits the new technology with meeting company targets of efficient payments while the technology has also allowed her to make her own study of the work process and to reduce redundant work.

Full-time data entry operators are the main ones experiencing the negative impact of computerisation - from employment loss to health hazards. However, different groups of data-entry operators working in various sections and on different tasks are still needed at the moment. One group translates (from photos) and keys in information daily into computer readable format from telephone calls made. However once the Call Data Information System (which will connect on-line the information from calls directly to the Data Centre) is implemented, their services will no longer be needed.

Another group of data entry workers is involved in billings. When computers were introduced to process billing in 1986, typists who used to write and type between 3,000 to 6,000 bills a month became redundant and were relocated to other sections. Subsequently data-entry operators were hired to key in bills at a rate of 10,000 - 14,000 key strokes per hour per day. Research conducted in 1992 (Ng and Yong, 1995) predicted this group would be made
redundant once the Post Office went on-line. However this Data Unit was still operating in 1995, although with a much reduced staff.

There are now 19 compared to 45 data entry workers before while the work load is still the same. Many workers have left, unable to take the work strain while others have been promoted to clerical levels. Because this unit is expected to close down soon there has been no new intake to replace those who have left. Meanwhile the remaining operators carry on under a more pressured and intensified regime, working overtime till the late evening and into the week-ends to cover the back-log. Now the number of records entered is the criteria for efficiency and not the number of key-strokes. As before, daily productivity charts are posted on the wall for peer pressure effect and evaluation purposes.

A third group of data-entry operators keys in all types of vouchers and bills (rebates, medical information, salaries, petrol claims, local orders, smartphone) although they are designated as clerks. They are lined up along with their terminals facing glass windows which are pasted with all kinds of paper (from pop-stars to computer print-outs) to keep out the glare.

It is obvious that full-time data-entry women workers face the most problems in terms of work intensity, pressure to perform under the "computer gaze" and suffer various types of health and safety problems associated with the continuous use of VDT. They have eye problems, headaches, neck, back and shoulder aches and feel exhausted during and after office hours. Moreover after work, they have to do the housework and take care of the family giving them no time to rest at all.

Similar intensification and control over work is also experienced by the international telephonists at MALCOM. During the days of manual response the telephonists seem to have more control over their work processes. They are required to write down customer and booking information on ticket slips; calls were limited to six minutes and there was more interaction with customers. At the end of the day they would collect and check their own tickets, arrange them by country and send the final accounts to the billing section. There was more time to move around, more cooperation with other telephonists, and one knew how many calls were made per day.
However, with the introduction of computerised exchange in 1985 and with privatisation, their work is more hectic and there are "endless calls without knowing where they start and end". Now they have to fulfil a quota of 3,000 calls a day. While in 1990 a call had to be completed within 10 seconds, apparently the current time given is five seconds. To make matters worse the computer is programmed to receive three calls at a time which the telephonist has to respond to. According to the all-female crew there is insufficient staff - traffic has increased but the staff is the same yet "management says we are over-staffed". What management does not take into account is the number of non-monetary calls they have to respond to, but rather calculate the calls which bring in revenue - an attitude arising from privatisation.

The computer also monitors their productivity and an hourly performance report is randomly recorded. There is not much time to move about and the supervisor also keeps a "movement record book" to trace their whereabouts (e.g. toilet, prayers, tea-break etc.). Nonetheless they do admit that with computers work is faster and more sophisticated ("canggih"), although they, like the data entry operators, suffer from VDT blues.

**Participation in Union Activities**

As of March 1994 the MALCOM union had about 17,000 members - 13,027 are men and 3,891 are women (23 percent), reflecting an underrepresentation of female union members, who form 35 percent of non-executive staff. Recently a Women's Section was set up and the extent of support for women-focused activities among the predominantly male-dominated leadership at the national and branch levels remains to be seen.

It seems that the union is an important arena where social conflict is being negotiated. While it seems to have some clout over economic issues (e.g. pay rise, increased allowances, and upgrading of job designations), it does not have a strong bargaining position where fundamental changes are being introduced in the organisation. For example there is no agreement between the union and management when new technology is being introduced, nor did the recent re-structuring exercise consider seriously the views of union members. According to the President, the union was "informed but not consulted".
5. THE ELECTRONICS INDUSTRY

The electronics industry has been dominating the export-oriented industry for more than the past two decades so much so that Malaysia has become the world’s leading exporter of semiconductors and the third largest producer, after the United States and Japan. In 1992, 58.5 percent of the manufactured exports in Malaysia, were electrical and electronic products. In terms of employment the electric/electronics industry generated about 31 percent of manufacturing employment. The majority of workers, particularly at the production level are women while the technical and management positions are mainly held by men.

The 1980s saw the electronics industry, particularly the semi-conductor subsector shifting towards higher capital and technology intensive production. Apparently the workforce is supposed to acquire new and perform multi-skilled operations in line with the requirements of technological innovations and the introduction of new production techniques such as just-in-time (JIT) and quality control circles (QCC). Company management policy has also changed from tight labour control practices common in the 1970s to one which promotes more employee participation and empowerment (Rasiah, 1994).

However in sharp contrast, the consumer electronics subsector is still labour intensive with its workers operating under more controlled spaces and receiving much lower wages than their counterparts in the semi-conductor firms. These firms mushroomed in Malaysia in the late 1980s and are mainly from Japan and the East Asia NICs.

The three case studies below highlight the differences in the technology and employment pattern in these two sub-sectors. One is a major American multinational semi-conductor firm located in the vicinity of Kuala Lumpur, the second factory is a joint venture between Japanese and Taiwanese capital, while the third is a small local factory situated in rural Selangor which produces parts sub-contracted for a larger consumer electronics firm in the city.
Case Study of MOTOR - a Semi-Conductor Firm

MOTOR started operations in Malaysia in 1972 and presently manufactures about 140 different types of semi-conductor components for the world market. It is linked to its parent company in North America which is the world's leading semi-conductor supplier to the automotive market. According to the Human Resources Manager, the firm is in the process of shifting gear. In the 1970s, production was manual and of the assembly type; products were of low value and labour was unskilled. The 1990s saw a move to product testing - a process which demanded high technology using semi-automatic equipment. Apparently by the year 2000, the high level of factory automation will see workers doubling up as both operators and technicians at the factory floor.

At the present moment the firm hires about 5,000 workers, 3,900 of whom are predominantly Malay female production workers. There used to be a larger workforce before but the advent of automation reduced the number of direct production workers. Wages start from RM450 a month, minus allowances and are purported to be one of the highest in the electronics industry.

A survey of 200 respondents was conducted, representing various sections/departments in the factory. The results showed that only 15 percent of the respondents were between the ages of 17-24 while 22 percent were between 35-44 years of age. The majority of the workers (66 percent) were married and were relatively well-educated as about two-thirds of them had had 11 years of schooling. In addition more than half of the respondents had served MOTOR for at least 11 years with 19 percent of them having worked between 16-20 years. This reflects that workers in this component firm are actually quite a stable, if not permanent workforce in the industry and are not the young and nubile factory workers according to popular imagination.

Nonetheless, despite their long service there does not seem to be much upward mobility for them. The majority of them have remained stuck to their original designation as production operators and, contrary to the statement of the management, do not seem to move up the occupational hierarchy. They might rotate within the operator ranks doing different jobs in different sections, and might be more flexible and multi-skilled, but chances for promotion appear to be very limited. The higher skilled and better paying jobs, such as technicians, engineers and managers, are still male dominated reflecting an unequal gender division of labour.
Does this mean that these women workers are being upgraded in terms of their skills and technological competence? Automation requires workers to read operating instructions/specifications and some machines require quick visual and motor coordination. Workers also rotate on the job in line with the multi-skilled concept of management. Others are taught how to do small repair work when the machine is stuck. The introduction of automation has led to an increase in work intensity. At least half of the respondents handle more than one machine while less than 10 percent handle between 4-8 machines at a time. Nonetheless these workers do not seem to be recognised in terms of occupational designation nor job advancement although they perceived themselves to be skilled workers. The trend seems to indicate a shift of worker characteristic from being cheap unskilled to cheap skilled labour in the electronics industry.

Recently MOTOR started a two year training programme to upgrade operators to become technicians. About 25 operators are selected after which they are promoted to the position of junior technicians. Although theoretically all can apply, and many do, there seems to be certain restrictions to being accepted. For example those who have a Form Five qualification, can speak English and have credits in Maths and Science are preferred over others. This effectively cuts off the older workers who came in during the 70s with a much lower qualification. While this is a praiseworthy scheme to upgrade women workers, in terms of practice, only three percent of the total operators can be promoted.

**Decision-making and empowerment**

As the MOTOR enters its new phase of high-value added production, it seems to be accompanied by a distinct change in management style and outlook. The key word today is that human resources is an important asset in production where workers are considered as partners in the company's operations. MOTOR has conceived of a number of "empowerment" programmes which have received favourable approval among its workers. In fact since the introduction of these programmes the zero defect target has been almost achieved. Ten years ago the number of rejects were 50,000 parts per million; today it has been reduced to 3 parts per million - a remarkable achievement indeed!

From the management point of view, MOTOR seems serious in pointing out that "the days of control in the Company are over". Indeed its role is to teach the workers to challenge the existing paradigm, to empower them and help them to learn, grow and expand their capacities. The importance of being creative and critical is in fact crucially needed to support the new
technologies that are being introduced whereby production relations have become more inter-
dependent and workers have to work as a team to achieve zero-defect quality and to chase the
ever increasing productivity curve.

Bearing this in mind, management has made it compulsory that every worker be given 40 hours
of training per year in "problem solving". Some of these activities are formalised and
incorporated into activities which will assist firms to achieve better quality products as well as
increased efficiency and productivity. For example, management has devised various human
resource development strategies and training programmes, couched in corporate familial
language and metaphors, to get what it wants. Some of these strategies designed to obtain
worker participation are a) Participative Problem Solving  b) Participative Management Process
and c) I recommend.

Participative Problem Solving

The participative problem solving process started in 1985 whereby workers in a particular
working area form a group, pick a problem in the line and discuss how to solve it together. This
group meets twice a month and are paid four hours overtime. The leader who leads this group is
called the empowerment leader. The various teams then compete with each other with the best
team being monetarily rewarded or winning a holiday to a resort island. This method is
extremely useful in cutting down costs and increasing efficiency as it provides workers with a
sense of participation in the production process. Actually they are the ones who monitor each
other rather than the supervisor who is fast disappearing as an occupational category in the firm.

An extension of this strategy is the Participative Management Programme which combines
operators and management in solving problems at the workplace. Again competition among
teams is held with the best team heading to the United States to visit the company headquarters.

‘I recommend’

These are suggestions in writing to improve the line, two of which must be sent in before the
middle of every month. Every suggestion is evaluated and the operator with a good suggestion
wins RM2. If the suggestion is implemented then the worker earns another RM5. Those who do
not send in their recommendations will be reminded as their names will appear on the bulletin
board. The owners of the top 200 suggestions will receive prizes such as umbrellas, clocks, bedsheets etc.

**Women Workers' Responses to the Changing Technology**

Several long-serving production workers were interviewed about company changes; their responses indicate the different and sometimes contradictory feelings of the women.

*Susie* started as an operator in 1976 and is presently a Quality Assurance worker. Through the years she observes that management has become more open and workers do get a sense of being "empowered". There are less supervisors now as the workers themselves can motivate each other to be more efficient and productive. She is also quick to add that "underlying all this, they (management) get what they want. They give you good machines but the target has to be met...in the long run the company gains".

She points out that management gives the illusion that one can be promoted easily. She herself applied to the training programme but was rejected both times. Susie has reached her maximum pay and position in the firm and can go no further. Why doesn't she apply to work elsewhere? She replies that she has no skills outside the firm. With only nine years of schooling, she lacks the paper qualification; moreover she is too old (35 years old) to move elsewhere.

Susie tried to form a union and wrote about it in a Speak Out programme (i.e. an avenue to voice complaints). However she said she was harassed by management and in the end had to retract the letter. As she put it so succinctly, "There is a hierarchy in the company. The operator cannot win".

Comparing the old and the new, *Anne* states, "Before the workers have time to rest, relax. But now there is no rest or else the machines will break down. There is more pressure now. The workers must write the "I recommend". The workers have to work non-stop like the machines. After training there is no increase in wages. In my 13 years of work the management only cares about quality and targets. Before workers could sit down, now it is eight (8) hours standing up. When I wrote in the speak out about increase in annual leave, I was called for a personal interview. They brainwashed me and told me it was not necessary. The problem is that we ordinary workers do not know how to argue our case".
On the other hand Maureen says there is freedom of speech. "Now we have empowerment. Even the GM when he meets a worker would greet her before the worker thinks of greeting him". Yet Maureen who started work in 1982 wants to quit her job in the near future. She discloses, "Shift work is tiring. Now I suffer from insomnia and heart problems; the doctor has prescribed sleeping pills for me". Her husband quips in "The company runs for profit at the expense of the workers".

**Freedom or Control?**

In MOTOR technology has changed work organisation with skills being dependent on judgement. Production processes which seem to be less dehumanising enhance productivity and decrease conflict. This change, coupled with management attitude, has made it difficult to organise workers. Nevertheless, a coercive labour force is maintained through the decentralised nature of new technologies. While on the one hand these new technologies are being employed through a decentralised arrangement, on the other, management control of workers is being made more centralised through their "participative" and "empowerment" programmes. According to Kuruvilla (1995) this may actually represent a more sophisticated form of worker control.

Besides, these programmes are very carefully administered to steer away from issues that are related to social benefits, wages and terms of employment. Workers are given the sense that they are participating in production improvements and increase. They actually do contribute in this way as the new information-based form of production depends more and more on the participation of these emerging cognitive, multi-skilled workers. Clearly "empowerment" programmes are promoted to coincide with the needs for production innovation and productivity, rather than for the enhancement of workers' social benefits.

A major finding from this study indicates that workers have a positive attitude towards their job, are willing to be trained and retrained, are not averse to technology and machines and have a high self-esteem of themselves as being skilled. Certainly, these are necessary pre-conditions for the development of an even more productive human resource base in the country. Yet, from another perspective it also indicates that in the more capital-intensive electronics industry, management has been quite successful in eliciting worker consent and cooperation in its pursuit for greater production and efficiency. Indeed the changes in production technology necessitate
greater levels of worker participation in the production process. Yet it is also in such companies that the effort to avert workers inclination towards unionisation is most strongly prioritised.

The Consumers Electronics Industry - MABUCHI and PERM

MABUCHI - A Japan-Taiwan Joint Venture

MABUCHI is situated in a recently established Free Trade Zone area, stretching 22 kilometres along the Tasek-Sungai Siput road in the central state of Perak. Most of the firms produce electronics products where women, mainly Malays and Indians, form 70 percent of the workforce. Apparently thousands of foreign workers, mainly Filipinas and Bangladeshis, also work there.

The factory was set up by Japanese and Taiwanese capital in 1990 to produce motor components for television, video players and refrigerators. It employs more than 4,000 workers; the production workers are all women earning a basic wage of RM10.50 a day. Other allowances include attendance allowance (which is forfeited if medical leave is taken), performance bonus and food allowance. All in all their take home pay is less than RM350, a monthly income which is below the poverty line in Malaysia.

The work process is labour-intensive and of the typical assembly-type where the operators are seated in a row next to a conveyor belt which moves the respective products down the line. Magnifying glasses are used to fit in specific minute components down the line with the operators working at a brisk pace set by the conveyor belt. Most of the lines entail soldering work and the use of chemicals, the names of which are not known to the workers.

Since 1995 the management has introduced new machines which can take over the jobs of a line which formerly required 20 workers to run. Now only two workers are needed to "woman" the machine. As a result workers have been laid off, the ones most affected being foreign workers whose contacts are not renewed. Apparently their numbers dropped from 1,800 in 1993 to about 330 today.

ALAIGAL found that these women workers, who have less than nine years of education, enter the industrial job market without any technical skills at all. As a result they are employed at the
lowest levels in the factories. Whatever skills they learn in the factory are not useful to go into other types of employment. Like most other firms in the Free Trade Zone, they work on shifts, do not receive any in-house training programmes, are not unionised, are pressured to do overtime and suffer from health problems (skin diseases, backaches, watering eyes) which they did not experience when working in the estates.

Despite these working conditions, many of the workers interviewed seem satisfied with their employers. This is because the company organises outings, dinners and fashion-shows for the workers generating a new kind of modern consumer lifestyle. Some even celebrate the birthdays of the workers showering them with small presents and parties. Apparently these modern methods of management have been effective in cushioning, if not curtailing labour discontent.

**Case Study of Sub-contracted work - PERM ELECTRONICS SDN BHD**

Perm Electronics is a factory located in Semenyih, a small town about 40 km south of Kuala Lumpur. Semenyih was formerly surrounded by rubber and oil palm plantations many of which have been re-developed into housing estates and golf courses. Small factories have also sprung up to take advantage of the displaced plantation workers in their workforce. The factory itself, which consists of two shop lots, is located in a commercial area surrounded by low-cost housing schemes. The factory runs behind closed doors and is not well ventilated, tending to become hot and stuffy in the afternoons.

PERM, incorporated in November 1985 - is a small company which grew out of the electronics industry in the country. Owned and managed by Chinese Malaysians it assembles and processes electronic components for electrical appliances. The work that is performed is essentially sub-contracted from the large companies in the vicinity. Initially the company produced switches for M. Sumida Electric Sdn. Bhd. which is a factory located in the Bangi Industrial Estate. However, in December, 1993 the workers were given one month's notice of dismissal because the factory was shutting down. In early 1994 the factory once again resumed operations with 40 workers. Initially 10 machines were utilised but later on six machines were sent to two new plants in two other rural towns.
Workers Profile

The company has a total of 36 workers, 92 percent of whom are Indian females from the surrounding housing estates where a large number of former plantation families live. The age of male workers range from 16 to 20 years, while female workers' age range from 16 to 40 years. There are six temporary workers three of them girls between 14 to 16 years of age. The workers receive RM260 per month as their basic salary; the other economic benefits include RM25 and RM12 per month for transport and meal allowances respectively. As far as the temporary workers are concerned, they are paid a flat rate of RM12 per day.

Working Conditions

All benefits such as leave and rest days are at statutory minimum levels. The only benefits that are above the statutory requirements are reimbursements for outpatient medical treatment and an annual bonus of one or two month's basic wages. Temporary workers do not get any benefits as they are paid only on the days they turn up for work. Most of these temporary workers are school children who attend school in the morning and work in the afternoons or vice-versa. Others are school drop-outs who cannot work in factories with machines until after the age of 16 years.

The planning in the company appears to be quite arbitrary in some ways. For instance workers will not know if they have to do overtime beforehand as this is only determined minutes before closing time. As the workers live very close to the factory, the management would send someone to their homes to ask them to come back to the factory even though they are on annual leave.

Despite this flexibility, workers have to meet daily production targets which keep the pace of work fast and stressful. They produce about 6,000 units in the switch department, that is 12 units per minute, while in the mechanised section a worker has to make about 10,000 units a day averaging 20 units per minute.

Technology and Production in the Switch Assembly

There are two types of switches which are produced in the factory. One is assembled manually while another is assembled by machine. The manual assembly of the switches involves great
dexterity of the fingers and good eyesight which is often under great strain because of the small size of the units.

Machines assemble another type of switch. In this process the worker has to insert in the bottom part of the switch while the machine fits in the top part. The worker has to step on a leg pedal to operate the machine. There are three machine operators with two line leaders above them who ensure that the quality requirements are met. A third production activity is also carried out by seven workers in the factory. Small parts of a type of switch are examined for defects before being sent to another company plant nearby.

There does not appear to be any significant change in the use of technology as the same machines continue to be used. However, the production targets have risen and quality requirements are more stringent. The low level of technology has also kept workers in a job where they do not acquire any useful skills for future job mobility. No adult men work in the factory as the young men leave as soon as they obtain another job. Similarly, girls leave just as quickly. The only ones who stay are women with young children who want a job that is within walking distance of their homes; or women who do not have the academic qualification to obtain jobs in the better-paying factories.

The factory does not have any training schemes. The older workers who are already adept at the work processes train the newcomers without incurring any additional costs. Even the production targets are maintained by other workers in the line producing more to make up for the fewer units assembled by new workers.

**Sub-contracting - the Other Side of New Technology**

It can be seen that Perm Electronics represents the low end assembly process of the consumer electronics industry. It is similar to the scores of other rural-based factories which undertake sub-contract work of the simpler work processes in the industry - the result of the introduction of new technologies and rationalisation strategies in the larger plants. However, although Perm Electronics is a small factory it is trying to be competitive in many ways by using a small workforce producing more units of better quality. The use of machines is also being maximised through the use of fewer machines but higher total production targets. It is also able to survive due to the low wages it pays to workers.
6. CONCLUSION: THE WAY FORWARD

In a space of less than forty years, Malaysia has shifted from an agriculture based economy to one whereby manufactured products have dominated the export market. Current industrialisation policy aims to move to a capital-intensive information-based system of production by the turn of the century. Much of the impressive economic growth has been spurred by foreign investment which, while ensuring Malaysia's entry into the global economic order, has also made the country vulnerable to MNC influence. For example, the recent global slowdown saw the retrenchment of 10,000 workers in the electronics industry - or about 10 percent of the female labour force. (NST, 15 September 1996).

In a sense the Government is caught between building a skilled, disciplined and knowledge-intensive labour force with concomitant improved working conditions and the desperate need to make its workers internationally competitive. Thus in order to continue attracting foreign investment, the state has often aligned with employers in restricting workers' rights to build a "harmonious working environment". It is with this scenario in mind that one has to comprehend the impact of technological changes on women's employment in Malaysia.

The paper has shown that despite Malaysia's wish to emulate the East Asian NICs it still lags behind in terms of technology capacity and the existence of a skilled human resource base which the government has been making efforts to upgrade. Companies are also turning to more capital-intensive technology not only to increase productivity and efficiency but to also address the labour scarce economy.

Cutting edge technology combined with restructuring has yielded some positive impact in terms of a vastly expanded network and services, better performances and economies of scale. However the impact on women has not been uniform. A small group of women, mainly graduates, has managed to make inroads into the information processing arena representing positive opportunities for women in this dynamic field. This shows that if women are provided the opportunities for training they can adopt quite easily to the employment opportunities offered by new technologies in this information era.
However the employment situation of the majority of women are still in the low-skilled or semi-skilled areas - a situation not unlike the position of women in other Asian countries. Thus even in the hi-tech industries, the case studies have shown that women workers form the majority of clerical workers, data-entry and production operators. Their lack of start-up technical skills puts them in a vulnerable position in the changing labour market.

Technological change has also resulted in job losses where large groups of lower level employees (men and women) are replaced by a smaller groups (mainly men) who possess higher skill levels. Differentiation by skill levels then polarise workers with women still remaining at the bottom of the skills ladder. In the last five years of increased liberalisation of the economy, the income gap has widened between these two skills groups. Despite Malaysia's robust economy and equity rhetoric, the 1996 UNDP Human Development Report showed that Malaysia has the highest rate of income inequality in Asia (STAR, 20 August 1996).

In terms of the case studies, MALCOM has not directly felt the impact of job losses so traumatically as being a public sector body (before privatisation) has prevented it from the worst economic disruptions. Moreover the relatively strong union struggled for its workers affected by restructuring to be retained in the new corporate company. However other negative effects regarding the work organisation are felt - such as intensified work environment and increased health and safety problems. These problems are mainly faced by lower-level female workers, who, as a result of the introduction of computers, are required to work harder and faster, with quotas monitored by the machine.

In MOTOR, women production workers are keen to learn new technological skills with the shift towards greater automation and computerisation. Management strategies have also been quick to adapt to these changes which need more cooperation and polyvalent skills at the floor level. These strategies which enhance worker participation should be emulated by other organisations wishing to progress forward in the post-industrial society. Technology should be viewed as a holistic process in which the human dimension is of crucial importance to its successful incorporation. Hence workers should have the knowledge as well as a voice in the content and method of technological adoption.

In order to meaningfully enhance the status of women workers in the technological era, these new skills which surely lead towards greater productivity should be recognised and amply
rewarded. A significantly large number of workers profess loyalty to the company, hence contributing to the success of the industrialisation drive. As such companies should award workers more social security benefits and to consider a policy of profit sharing, with worker equity.

At the other end of the electronics spectrum is the existence of small rural-based companies which undertake sub-contracting work for the larger factories. Again the majority of the workers are women who, unlike their labour aristocrat sisters in the component firms, are employed under exploitative and flexible working conditions. Policies have to be designed to ensure that their basic rights, particularly the right to organise, are upheld.

Firms which recognise the right of workers to organise seem to offer a better deal for workers. This can be seen in the case study of MALCOM where the union fought for the right of workers made redundant by computerisation to be deployed to other departments. The State must realise that the promotion of workers’ organisations is not antithetical to productivity and profit making, as disclosed by a World Bank study that Malaysian firms with unions had a higher productivity rate compared to non-unionised ones (NST, 6 December 1995).

Which brings us back to the original intention of the project - to bring women's voices on the agenda of technological change and industrial policy-making in Asia. The critical information gathered by the NGO partners in the project has made them realise the complex nature of technological change and women's employment, and the realisation that it is not possible nor realistic to adopt a pro or anti technology position. For the policy makers, they have also come to accept, from the ensuing discussions, that new strategies and policies have to be formulated, with input from NGOs, to "manage the market", so to speak, at national, regional and global levels.

While the state and peoples' organisations have generally shied away from each other in the past, both are now recognising the need to collaborate (in a critical fashion) with each other to counter the negative consequences from the encroachment of global capital - united by the lowest common denominator of ensuring that women are not excluded from the spread and benefits of new technologies.
As gleaned from the Bangkok meeting, various shades of state-NGO relationship exist - from openness on both sides to veiled antagonism. Nonetheless a start has been made with specific policy-makers willing to listen if the NGOs had "valid" knowledge, and the NGOs understanding a little better the monstrous bureaucracy of policy formulation.

Surely, different strategies might need to be adopted to suit the concrete and complex situation of different countries. In this context, the UNU/INTECH project has performed a credible task in providing the legitimacy, expertise and the forum to bring the two groups together.

However cooperation of all sorts and open communication are needed to ensure any successful outcome. Economic and technical cooperation rather than competition (the underlying rhetoric of globalisation and liberalisation) will be more beneficial and equitable to all in the long run. States need to provide more protection in this period of deregulation - they cannot reneg on this responsibility and it is up to civil society - the NGOs and other organisations - to dialogue and to remind them constantly of their role. I believe a small start was made in this project.
7. REFERENCES


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Women's Committee, Malaysian Trades Union Congress (1995) _Technological Change and Women's Employment - Case Study of a Telecommunications Company in Malaysia_, unpublished manuscript submitted to UNU/INTECH.
8. ENDNOTES

i. This project was originally initiated by UNIFEM (United Nations Development Fund for Women) and later drawn up and supported together by UNU/INTECH and the Ministry of Development Cooperation, The Netherlands.

ii. These countries were Bangladesh, China, India, Indonesia, Korea, Malaysia, Sri Lanka and Vietnam. The project team was headed by Professor Swasti Mitter of UNU/INTECH. The author joined INTECH from mid-1994 till June 1996 while Rohini Banaji was engaged as a consultant until August 1995.

iii. Of the total 30-40 million Internet users, 69 percent are from North America, 45 percent are professionals and 56 percent are between the ages of 21 and 30 (New Straits Times, 6 February 1995). An interesting discussion of the use and abuse of IT can be found in the October 1995 newsletter of the IFIP Working Group 9.4 entitled "Information Technology in Developing Countries".

iv. A UNDP commissioned study (1995) pointed out that Malaysia is still within the first stage of technology transfer i.e. adoption stage as opposed to the rooting and diffusion stage. The bulk of the transfer was between the lower-to-moderate level of sophistication while the majority of the technology transfer agreements concerned foreign-owned firms operating in Malaysia rather than Malaysian firms. Nevertheless the study was optimistic that Malaysia would move to the other two stages.

v. For example Wacjman (1991) informs us that the number of female students taking computer courses in England is decreasing, further strengthening her theory that technology is engendered.

vi. It would be useful to expand these clubs which at present are mainly concentrated in the urban areas and thus cater to specific socio-economic groups, mainly non-bumiputras (Ng and Yong, 1995). A study of the gender, class and ethnic dimensions of computer education and teaching would enlighten us on the direction and future of the much vaunted information society in Malaysia.

vii. The research was conducted by Safiah Suhaime from the Women's Committee of the Malaysian Trades Union Congress. She was assisted by the author and Neeraj Joshi.

viii. This case-study is part of a larger SIDA-funded study undertaken by the author and Maznah Mohamad.

ix. The Mabuchi study was conducted by Sarasvathy of ALAIGAL, a workers’ organisation dealing with estate and more recently factory workers; Devaki Arumugam of Sahabat Wanita, a women workers’ group studied PERM. Both of them conducted their case studies with the help of key women workers who worked in the respective factories.
Apparently local educational institutions can only provide 58 percent of engineers and five percent of the skilled workers needed. Only 200,000 out of the annual projected demand of 500,000 skilled and semi-skilled workers can be met, revealing a near crisis shortfall in human resources.