Industrial Restructuring and Its Impact on Education and Training in Cyprus

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1. Introduction

As a country makes its way from one phase of development to the next, its education and training system should be reconsidered. This is mainly due to the new needs presented by redefined policy objectives, the increasing intensity of international competition, changing technology and changes in the economy's access to major markets.

All of these factors have come into prominence in Cyprus in recent years. Structural changes and developments in the Cyprus economy and the implications of the recent Customs Union agreement between Cyprus and the EEC have thus set a new framework for manpower planning and educational and training policies. Moreover, these new training policies are also necessitated by technological enrichment and advancement and the application of new work practices, as has been shown in Japan, West Germany, Sweden and many other industrialised countries.

In tackling these implications for training in Cyprus, I will assume that the broad international trends of technological advance and organisational change are known.

2. The Case of Cyprus

The main findings of the recent UNDP/UNIDO missions for the Cyprus Industrial and Technology Strategies concerning the technological level of the industry can be summarised in eight points:

i) By and large the firms visited were relatively well-equipped. In some cases the equipment was state of the art and more advanced than would be customary in firms of an equivalent size in Europe.

ii) Much of the machinery, particularly the most modern, was operating below capacity. From the point of view of the economy, this represented over-investment in fixed assets.

iii) One aspect of the over capacity problem was that investments had been made in specialised machines geared to large batch or mass production of particular products.

iv) In some instances new machines had not been bought because of the small market size.

v) In spite of the incentives, industry possessed relatively little computerised machinery. This comprised a few CNC machines in the metal working sector, some computer controlled equipment in clothing, no CNC or electronically controlled equipment in furniture and footwear and no CAD equipment in any sectors.

vi) There is little evidence of generation, improvement or adaptation of technology.

vii) The absence of a technological culture in both the public and private sectors of Cyprus is notable and compares unfavourably with competitor countries.

viii) The identification, appraisal and selection of technology results from haphazard and poor information.

In characterising Cypriot Manufacturing of the 1980s, the Missions concluded that it was primarily comprised of labour-intensive light industry, geared to consumer markets, operated by family firms, with a predominance of semi-skilled manual labour.

The main organisational difficulties were found to be:

- poor capital utilisation
- lack of specialisation
- long supply lines for imported inputs
- little design capacity
- high working-capital requirements
- tight labour markets, with lack of specialised, high-level skills
- fragmented ownership structure
- insufficient quality control
- sub-optimum plant layout
- lack of specialised managerial skills
- low productivity

Expected Developments in Cypriot Industry

By studying the above findings of the UNDP/UNIDO mission, evaluating recent Industrial Training Authority (ITA) surveys and bearing in mind the international state of the art of technology, I believe that the following developments are to be expected during the next decade. All of these have a bearing on education and training policies in Cyprus, and include both technological and organisational changes.

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The technological improvements in Computer-Aided Design (CAD) equipment in recent years and the remarkable fall in its price means that it is a useful and a more accessible tool for larger Cypriot firms. The least that would be expected in the very near future is the establishment of a CAD bureau offering services to firms on a commercial basis. For example, the tasks that can be undertaken using the CAD equipment in garments include pattern development, pattern grading, layout planning and marker working. This would mean a low lead time, especially in developing fashion and pattern grading and achieving the best possible material utilisation and thus lowering cost. It also seems that there is a good opportunity for introducing computer-controlled cutting equipment, thus increasing the quality of cutting and saving material and time. In addition, the introduction of material quality inspection and measurement equipment is also essential.

In the production sphere, the introduction of Flexible Manufacturing Cells (FMCs) and Flexible Manufacturing Systems (FMCs) is not feasible or viable in the near future. The reason for this is that these flexible machines are too expensive by Cypriot standards and are anyway at an early stage of development. Their acquisition is thus too risky. Also, flexible manufacturing machinery is nowadays used mainly for the production of components and high value capital goods or in the pre-assembly stages, rather than manufacturing goods (like furniture, garments and shoes) that need assembly operations in labour intensive processes. Similar arguments apply to robots, automatically guided vehicles and self-guided vehicles. Thus there is little possibility of introducing a totally integrated manufacturing system such as Computer Integrated Manufacturing (CIM) before the year 2000. Also within the production sphere, the only type of machinery for which electronics-based automation is commercially viable in Cyprus is stand-alone automatic and computer controlled machinery and equipment, including non-integrated Flexible Manufacturing Units. This involves only a limited degree of systems integration, but to be viable it requires the reorganisation of production into families of parts. Automated or semi-automated Materials Handling Systems seem feasible, especially in large firms with long run production lines. This will make things easier in the movement of components and semi-assembled parts, lowering lead time in the production sphere and economising on factory space and time.

In the coordination of production there is plenty of scope for the introduction of microprocessors for order planning, stock control, product costing, production monitoring, payroll and accounting. Also, management information systems used in Cyprus are often very primitive. In the coming decade most of the medium and large companies are expected to make use of the facilities of a computerised system for information and data processing.

Experience has shown that switching from standardised production to flexible production needs rethinking and re-orientation. Reorganisation and the introduction of new work practices is a must, both for reasons of acquisition of a high degree of production flexibility and in order to be able to choose the right technological base founded on flexible automation. It is my belief that a fruitful organisational change in the average Cyprus firm will eliminate the need for complex flexible technological systems.

The introduction of 'Just-in-Time', Total Quality Control and Total Preventive Maintenance Systems, together with changes in the management style, philosophy, attitudes and perceptions, and greater reliance on the skills, knowledge, expertise, creativity and initiative of employees, will make it possible to increase productivity, design, quality and profitability. In this way we shall all witness another '*thavma*' (the greek word for miracle).

3. Impact of New Technology and Work Organisation on Education and Training

The Need for Different Kinds of People

It is the quality of its labour force that will determine a firm's competitiveness and success, and the reorganised factory of the future will need different kinds of people at all levels of the hierarchy. Five level of personnel are discussed below: production workers, supervisors, engineers/technicians, managers, and designers.

(a) Production workers

— The workers must be given sufficient training and guidance to do their job properly. Quality and performance standards for the job must be clearly defined. They must be well-equipped to do their job and encouraged to ask for help or even additional training.

— The new practices require the worker to be multi-skilled, multi-tasked and to develop multi-functional capability if production bottlenecks are to be avoided and if production losses due to frequent design and product changes are to be minimised. The skill base thus has to be both broadened and deepened.

— The workers must be able to operate in groups and to have responsibility for deciding among themselves on issues such as work organisation and solving a range of problems which arise during production.

— Creativity and initiative are essential for the solution of these problems. This will only emerge when workers are encouraged to offer suggestions

in quality circles, and to suggest schemes for product development and for improvements in process, quality, productivity and working conditions.

— Workers must be adaptable to continuous change and be prepared for frequent job changes.

(b) Supervisors

— The supervisors must learn that their primary responsibility in production is to support and facilitate the workers rather than to assume a dictatorial attitude.

— Supervisors must be retrained to have quality as their main objective and not to see their primary function as squeezing more output out of workers.

— They must be able to take quality problems to management and expect action.

— They must eliminate fear in the workplace and be able to communicate and cooperate freely, both vertically and horizontally.

— Supervisors must be people of initiative and creativity, and be able to inspire their fellow workers.

— They must have a very good knowledge of the new work practices, production planning/control and reorganisation of production.

— They must be multi-skilled and multi-functional.

— Supervisors must be up-to-date on technological developments.

(c) Engineers/Technicians

— Engineers must be not only multi-skilled, but also multi-disciplined. Ideally, they should have electrical, mechanical, electronics and computer knowledge.

— The role of the engineer is often seen as white-collar and managerial, whereas engineers in the new practices are expected to be constantly involved in solving problems on the shopfloor in support of production workers. They must be ready to dirty their hands.

— They must be constantly concerned with improvements in the production process to increase performance, to improve quality and to suggest ways for product development.

— Engineers must be up-to-date on technological developments.

(d) Managers

— Management must understand the logic of the new organisational practices and be fully committed to the fundamental changes they involve.

— Management must change its attitudes and perceptions and be willing to adopt a completely different set of attitudes and standards.

— Management's task is to create the right environment for workers to apply their creative thinking, energy and skills, to use their initiative in the solution of problems, and indeed to rely on these workers. It should invent and apply incentive schemes that stimulate the workforce to become quality minded, actively engaged in efforts towards improvement and positive about further training.

— Senior management can concentrate on strategic planning for changes in market demand.

— Management should adopt a wholistic approach to production, recognising the interelatedness of changes in different parts of the labour process and the enterprise.

(e) Designers

— Designers should be well informed about the market, consumption and fashion trends.

— They should have direct and close relations with all the key people in the company, especially production managers, supervisors, marketing and sales people.

— They must have the necessary technical knowledge for all the jobs in the production line.

— They must know if the product may be constructed using the available resources (machinery, equipment, manpower, know-how) of the enterprise.

— They must be aware of all the raw materials and components required.

As can be seen from the above analysis, the impact of the introduction of automated technologies and new work practices on the labour force is enormous. The types of workers and the levels of skills needed are changing. A better educated, better trained and more adaptable workforce is thus needed.

Education

After studying a number of flexible companies in Sweden, Haywood and Bessant have concluded that the proportion of graduates employed will rise from three per cent to ten per cent in five years, as more school leavers plan to enter higher education and acquire technical high school training. In the same country, school-children of 13 visit and work within local companies for at least one week per term, as an introduction to the world of work. At 15 the period increases to two weeks, and at 16 or 17 they receive more extensive vocational and technical education.

In West Germany, less-able pupils are given a more

practical and vocational emphasis in their studies. This gives them more interest in their schoolwork, as well as preparing them for subsequent vocational training [Prais 1985]. Broadly speaking, the German system of vocational training stipulates that all pupils not otherwise continuing in full-time education should attend one day a week for the following three years at a vocational school associated with their job and then should take examinations.

Japan, on the other hand, lacks a national vocational training system [Baxter and McCormick 1984]. In fact, Japanese firms have no interest in school vocational education. They recruit workers at various levels on the basis of their attitudes and their general level of education attainment. In terms of attitude, employers seek people with the ability to learn and the will to work with others [IMS 1984]. Most of the effort is initiated and controlled by larger firms who set their own standards and have a deep commitment to providing adequate and flexible industrial training.

In Britain the training emphasis is on individual craft skills, with greater emphasis on national training standards. In this context it is very difficult to offer multi-skilling training [Senker 1986]. Recently the British government launched a new training initiative to widen and enrich the curriculum of technical and vocational education [TVEI].

After studying the vocational education and training systems in Britain, West Germany and Japan, as well as the economic performance of these countries, Senker argues that 'in an environment of more rapid technological change, extensive vocational training to national standards may no longer be the most effective route to economic competitiveness. In this environment, in-house training by firms to meet their own specific and changing needs may be more effective from an economic point of view' [Senker 1986].

Secondary education in Cyprus provides a six-year course which is divided into two cycles of three years each. The second cycle is offered in either the Lyceum of Elective Subjects or in the Technical/Vocational Schools. Within each branch of the Technical and Vocational Sections certain narrow specialisations are offered. There is no university institution in Cyprus, and school leavers have to travel abroad to acquire higher education. Tertiary level education is offered domestically at institutions like the Higher Technical Institute, the Mediterranean Institute of Management and other public and private institutes.

Two Main Courses for Secondary Vocational Education in Cyprus

The first choice for secondary vocational education would involve abolishing the Technical/Vocational cycle of Secondary Education and letting everyone follow the Lyceum of Elective Subjects. In this case the curriculum of general education would have to be adapted to provide industry with people with the appropriate attitudes, general background and knowledge. School leavers could later join either an in-house Vocational Training Scheme (as in Japan) or a combined (both in-house and institutional) Vocational Training Scheme apprenticeship (as in West Germany).

The second alternative is to amalgamate the Technical/Vocational cycle into a single cycle. This would require improving the curriculum, raising the general standard of the vocational education given and producing a multi-skilled/multi-tasked labour force. Institutional education would clearly have to be combined with in-house training.

Whatever choice is made, students must be able to follow existing (or other specially designed) full-time academic/sandwich courses at the Higher Technical Institute (HTI). The output of this system (engineers, technicians, and multi-skilled personnel) will be one of the most important ingredients in industrial restructuring.

A final point to be made is the very important role of the vocational guidance system and the valuable services it has to offer in the whole process. Also, in the future the government must consider playing a more direct strategic and planning role in the general choices to be made by parent and pupils at both secondary and tertiary levels of education.

Training

Only a few general guidelines can be given here on the training system. These include:

(a) If the limited resources of Cyprus are to be put to good use, the provision of training must be a continuation of, or be interconnected with vocational education (see the two choices described in the section above).

(b) Activities in the industrial training field must be coordinated so as to meet the ever growing need for training.

(c) Industry must be provided with multi-skilled trained manpower at all levels and in sufficient numbers.

(d) With rapid technological change and application of new work practices it is preferable that most training for operators and assembly line workers be provided *in-house* (as in Japan and West Germany). This means that firms must be committed to training, and have adequate knowledge and facilities, as well as the right attitude to provide systematic training to satisfy their needs.

(e) In cases where problems arise in the capacity to provide in-house training because of the existence of small firms unable to offer the right quantity and quality of training, the provision of group training in large firms could be explored.

(f) Special training centres must be created to cater for occupations for which there is a great, urgent and continuous need. In the case of Cyprus, this is especially relevant for sewing machinists for the garment and footwear industries.

(g) The institutional training infrastructure must be adequate — both in terms of quantity and quality. This involves the provision of buildings, machinery and equipment, instructors and training specifications.

(h) All the lecturers and instructors must at some stage work in industry. This will help them to be in touch with the realities of their profession. They should also attend specialised courses and seminars abroad to keep in contact with technological changes and other improvements in their field.

(i) The system must provide scholarships/grants to students and employees to study abroad in subjects which are most needed by industry, and also incorporate into the system lecturers and consultants from abroad.

(j) It is of paramount importance that the curriculum of the post-graduate course offered by the Mediterranean Institute of Management and the ITA itself, (whose main aim is to provide assistant managers, production managers and supervisors to industry) must be improved to include subjects and practices related to the chosen industrial strategy (these include flexible automation, JIT, TQC, TPM, incentive schemes, new industrial relations and new manufacturer-supplier relations and, new manufacturer-retailer/customer relations).

(k) New training and retraining schemes must be created for the better utilisation of unemployed university and college graduates.

(l) The training system must be able to give managers, engineers/technicians, and supervisors up-to-date information concerning technological changes and new applications. This can be arranged by organising seminars using local expertise, through the services of foreign consultants or even by contracting leading edge technology institutions to provide state-of-the-art advice to industry on a regular basis.

(m) Local management, organisation and technology consultants must be fostered, capable of mastering the new principles and practices for the upgrading of industry. This includes the organisation of courses for existing consultants, civil servants, the unemployed and university graduates. These courses should be run by foreign consultants in Cyprus or abroad where the participants could visit companies with relevant specialisation production systems.

Over and above these 13 points, the most important and urgent action to be taken is the re-education and transformation of managers to implement the chosen strategy of flexible specialisation into Cyprus industry. But how is this transformation or re-education of managers to be brought about? Four different methods of management education/training are mentioned in the literature, of which the first two are believed to be the most productive.

(i) Visits to Japanese plants or 'converted' firms abroad to learn how the new principles are applied;

(ii) Advice by management consultants with expertise in the new practices;

(iii) Self-study of practices and principles (learning from 'cookbooks');

(iv) Seminars, workshops and a variety of consciousness-raising activities undertaken by employers' associations, academics and consultants.

The most practical way of achieving this is to identify one or two leading firms in the priority sectors with innovating and open-minded owners/managers and to use them as pilot cases. If these pilot studies are successful, the task will be much easier. Other managers will start visiting the 'converted' companies and the strategy will gain momentum. During the pilot process the management consultant responsible for the study can run a consultancy course for the generation of a local task force (see point 'm' above) as well as taking part in a variety of other training co-activities.

Policy issues, together with any problems and difficulties arising from the points above, should be studied in depth by the ITA and the Ministry of Education in close collaboration and cooperation with the Planning Bureau and the Ministry of Labour. The outcome of this process should be a Total Educational and Training System for the satisfaction of the changing short-term and long-term manpower and training needs of the economy and the particular industry.

4. Conclusion

The process of introducing and applying flexible specialisation in Cyprus industry must be accelerated because of the obvious advantages this new production system has over the old-fashioned mass production system. It has been nearly two years now since the reports on Cyprus Industrial and Technology Strategy were prepared, and valuable time has been lost. The government must implement the Mission's recommendations as soon as possible, and all parties concerned — government, industry, and trade unions — must be involved wholeheartedly.

I believe that the formulation of the right training policy and its implementation by using the right strategy is the best input the educational and industrial training systems can provide to the whole industrial restructuring process, and the best service they can offer to the Cyprus economy in general and Cyprus industry in particular.