

An Assessment Of New Technical Courses Required By Industries In Johor*

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ABSTRACT

Almost 3,000 skilled workers are produced by various skills training institutions, polytechnics, technical schools and vocational schools in Johor, Twenty Percent of these 'skilled workers' are actually trained dressmakers and beauticians – skill which are relevant to the manufacturing industry. Out of the remaining 2,400 skilled workers, 20 percent would opt to work in other states except Johor; and overseas especially Singapore, Japan and Taiwan. On the other hand, there is need for 30,000 skilled and semi-skilled workers to match the industrial sectors' demands. The shortage of skilled workers is made worse by the mismatch of skill produced and industrial demand, as well as inappropriate training programmes employed by government-sponsored technical training institutions.

A survey was conducted in mid-1991 to assess the requirements of the manufacturing industry which are capital intensive and technological oriented based on then 'new' technical courses: Tool and Die, Basic, Electronics, Instrumentation (flow process), Pipe and High Pressure Welding, Chemical Technology, Mechanical Draughting With CAD, Surface Mounting Technology, Non-Destructive Testing, Rigging and Scaffolding, and High Precision Laser Cutting.

This paper describes the process undertaken in conducting an industrial survey and the interpretation of the analysis based on the findings of the study. The outcome of the survey which is presented in the final sections of this paper, should provide important data and insights for policy makers in reviewing the future need and form of technical training for technicians.

INTRODUCTION

By the year 2020, Malaysia hopes to become a fully developed country. The Second Outline Perspective Plan (OPP2) embodying the New Development Policy (NPD) will set the pace for Malaysia to realize this vision. As outlined in OPP2, apart from capital and technological development, one of the key factors that will be an impetus in the economic transformation towards greater industrialization is the quality of available human resources especially in terms of technical skills.

Between January to April 1991, out of 337 industrial projects that have been approved by MIDA (Malaysian Industrial Development Authority), 64 (or 19%) of these projects are in Johor. In terms of priority, Industrial Estates in Pasir Gudang, Senai, Tampoi, and Tebrau have been earmarked for Such projects. With the projected employment opportunities available for 11,728 workers in Johor, the existing technical training institutes can play a significant role in enhancing these workers' skills by providing effective training programs geared to the industrial needs.

In June 1991, the Head of Industrial Institute, Pasir Gudang (ILPPG) and the Chairman of the Industrial Board sought assistance from Unit Penyelidikan dan Perundingan to assess the requirements of the manufacturing industry based on ten new technical courses. A team of management lecturers from the Faculty of Management and Human Resource Development responded to their request by conducting an industrial survey. The team were given two months complete the survey and produce a report for presentation to the relevant ministries.

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METHODOLOGY

A review of literature was initially carried out to study the nation's industrial plan. The materials gathered were then used to focus on the future industrial needs of Johor.

A questionnaire was developed by the team of management lectures to obtain the necessary data from the manufacturing industry. The actual field work (interviewing session) was conducted by ILPPG's teaching staff due to time constraint. Their familiarity with the manufacturing industries in Johor was another factor taken into consideration. The ILPPG's teaching staff were briefed on the finer points of conducting the interview and were told to interview personnel and technical managers of the manufacturing industry.

A pilot study was carried out in order to test the reliability and validity of the questionnaire. Four firms from the pasir Gudang Industrial Estate were selected for the pilot study. After completing the pilot study and revising the initial questionnaire, personal interview on a wider scale was carried out two weeks during the month of July.

Final analysis was done by using a computer package - Statistical Analysis System (SAS) which is available from UTM's mainframe.

Limitation of the Study

The findings of this study must be interpreted with caution. A generalization of the overall industries should not be made since the study used stratified sampling technique based on 20 percent of the total of industries in Johor.

The following delimitations are made for the purpose of the particular study:

1. The study was cross-sectional rather than longitudinal and the data collected are mainly to a single points in time. For instance, actual observations of persisting problems over time is precluded.
2. On the spatial dimension, the study was restricted to manufacturing industries located in various Industrial Estates in Johor. This limitation does not affect the reliability and validity of the study due to the sampling technique used for the study.

However, a majority of industries in Johor are small and medium sized, thus affecting the outcome of the study.

Sampling Design

Stratified sampling methods was used for the study. The population of the companies were based on the list of major industries compiled by JSEDC Investment Centre. There are 615 major companies in the data base. These companies were divided into 12 sampling units based on the types of industry.

At the final stage, a random sample of 20 percent from each sampling units were chosen for the final sample. One hundred and twenty three companies were selected for the sample.

This method assured representativeness of each industry for the study. It also considered the size of the samplings units. Therefore the dominant industries would have more representation in the final sample.

However, out of 123 companies selected, only 113 were interviewed. The remaining companies were not interviewed due to the following reasons:

- a. The companies did not use the registered address
- b. The companies had moved somewhere else
- c. The companies had gone out of business
- d. The ownership, name and functions of the companies had changed

Findings

The findings are divided into the following categories: companies' characteristics, training, and industrial courses preferred.

Companies' characteristics

A majority of 35.4 percent of companies surveyed are subsidiaries and 25.7 percent are joint venture between private companies with majority interests (Table 1). It should be noted that most of the wholly-owned subsidiaries of multinational corporations originating from Singapore, Japan, Taiwan, America and Korea. Most of these companies are attracted to the favourable investment climate in Johor and the spillover effects of Johor's neighbour – Singapore.

Table 1: Types of ownership

| Types of ownership | Percentage |
|----------------------------------------------|------------|
| Parent company | 16.8 |
| Wholly-owned subsidiary | 35.4 |
| Joint-venture (government majority interest) | 7.1 |
| Joint-venture (government minority interest) | 0.9 |
| Joint-venture (private majority interest) | 25.7 |
| Joint-venture (private minority interest) | 6.2 |
| Others | 8.0 |

A majority or 46 percents of compaines surveyed have more than 10 years operation (Table 2). The important of the establishment of these companies are considered to be an important factors in assessing the validity and reliability of the study.

Table 2: Number of years operation in Malaysia

| Range of year | Percentage |
|----------------------|------------|
| Less than 3 years | 19.5 |
| Between 3 to 6 years | 19.5 |
| Between 6 to 9 years | 15.0 |
| 10 years or more | 46.0 |

About 48.2 percent of companies surveyed are labour intensive, 36.6 percent are capital intensive and 15.2 percent are combination of labour and capital intensive (Table 3). This findings reflects the results of a separated study by Asia Development Bank¹ which indicated that most factories in Malaysia are involved in low-technology activities which originated from more advanced countries such as Japan, Taiwan, Singapore and Korea due to the relatively low labour cost.

Table 3: Types of Technology

| Types of technology | Percentage |
|---------------------|------------|
| Labour intensive | 48.2 |
| Capitol intensive | 36.6 |
| Combination of both | 15.2 |

With reference to Table 4, a majority or 45.0 of companies surveyed obtained technology from parent company (total and partial), while 42.3 percent acquire technology locally.

Table 4: Acquisition of Technology

| Methods | Percentage |
|---------------------|------------|
| From parent company | 45.0 |
| Locally acquired | 42.3 |
| Others | 12.7 |

This may indicate that the local technological development is not the requirement of the multinational corporations, or a preference of these companies to adopt technologies developed by their parent companies.

Table 5: Most Serious Problems in Production

| Types of Problems | Percentage |
|----------------------------|------------|
| Raw material | 6.3 |
| Low productivity | 5.4 |
| Changes in technology | 5.4 |
| Recruiting skilled workers | 75.6 |
| Others | 7.2 |

A majority or 75.6 percent of companies surveyed have problems in recruiting skilled workers (Table 5). This findings is attributed to the acute labour shortage problem in Johor which is made worse by the fact that most of these companies are very labour-intensive. Therefore, staff pinching and job-hopping among staff are common phenomena in most companies in Johor.

A majority or 85.5 percent of companies surveyed have preference for inhouse training, compared to 1.8 percent for government-sponsored training institutions (Table 6).

According to a study by Asian Development Bank *2, a number of criticisms have been made by private sectors on government-sponsored training institutions. In particular it is said that.

- i) Skills are often general to be applied in a specific industry without considerable supplementary in-house training ; and
- ii) machines used in training institutions are often obsolete or otherwise inappropriate

Table 6: Types of vocational training

| Types of training | Per centage |
|----------------------------------|-------------|
| In-house training | 85.5 |
| Parent/subsidiary co. (locally) | 1.8 |
| Parent/subsidiary co. (overseas) | 3.6 |
| Private training institution | 0.9 |
| Government training institutions | 4.8 |
| Others | 6.4 |

Therefore, government incentives in the form of tax deduction for training may have minimum impact to the private sector. Unless the aforementioned weakness are rectified, the government-sponsored training institutions would always always be at the losing end.

A majority or 70.8 percent of companies surveyed have technicians with salary ranging from \$501 (Table 7). This salary range may not be much in Johor Bahru which has a high cost of living. Due to the wages offered in Johor, a number of technicians have chosen to work in Singapore and earn 3-4 times their basic monthly salary in Johor.

Table 7: Average Basic Monthly Salary for Technician

| Range | Percentage |
|------------------|------------|
| \$500 and below | 18.9 |
| \$501 to \$1000 | 70.8 |
| \$1001 to \$1500 | 8.5 |
| more than \$1500 | 1.9 |

It is interesting to note that quite a number of 'local' technicians prefer to work in Singapore after working in Johor for a few years. This unhealthy trend will continue to persist until the wage rate improves significantly.³

Training

A majority or 52.7 percent of companies surveyed have preference for intermediate level of training, 31.9 percent for basic training and 15.4 percent for advanced level (Table 8). The low percentage for advanced training is due to the fact that Malaysia has only one training centre (Advanced Training Centre, Sepang) which offer advanced level vocational training equivalent to Master Craftsmen level. Most firms are not aware of the existence of the Advanced Training Centre in Sepang⁴. Furthermore, most firms prefer an in-house program for advanced training.

Table 8: Level of technical skill preferred by industries

| Level | Percentage |
|--------------|------------|
| Basic | 31.9 |
| Intermediate | 52.7 |
| Advanced | 15.4 |

As an example, Sime Simbawang in Pasir Gudang, Johor has started their own welding training programme due to the shortage of skilled welders. The programme incorporated the National Vocational Training Board (MLVK) and specialised skills skill in welding and fabrication for the shipyard industry.

A majority or 51.0 percent of companies surveyed have preference for technicians with 1 to 3 years experience, 29.8 for trainees fresh from training institutions and 4.8 percent for technicians with more than 5 years experience (Table 9).

Table 9: Criteria for Employing New Technicians

| Criteria | Percentage |
|-------------------------------------|------------|
| Fresh from training institutions | 29.8 |
| Less than 1 year working experience | 14.4 |
| Between 1 to 3 years experience | 5.10 |
| Between 4 to 6 years experience | 1.0 |
| More than 6 years experience | 3.8 |

Technicians fresh from training institutions have to be retrained for specific tasks, but because of the acute shortage for technicians have been 'booked' by firms even before they graduate.

A majority or 42.0 percent of companies surveyed have preference for training conducted during part-time (weekend), 24.3 percent for part-time (night) and 19.1 percent for training by modules (Table 10). Part-time courses are preferred because the companies cannot afford to lose their technicians (the few that have) during regular working hours.

Table 10: Types of training programmes

| Types | Percentage |
|---------------------|------------|
| Modular | 19.1 |
| Full-time | 6.6 |
| Part-time (night) | 24.3 |
| Part-time (weekend) | 42.0 |
| Others | 8.2 |

A majority or 43.3 percent of companies indicated development problems are due to lack of professional trainers, 41.2 percent due to lack of training facilities and 15.5 percent due to budget constraint (Table 11).

Table 11: Problems of training development

| Types of problems | Percentage |
|-------------------------------|------------|
| Lack of training facilities | 41.2 |
| Budget constraint | 15.5 |
| Lack of professional trainers | 43.3 |

These problems are prevalent among government-sponsored training institutions. Government-sponsored training institutions also have difficulties in retaining their instructors; thus worsening the problems of shortage of professional trainers.

Industrial Courses Preferred

For 1991, 25.3 percent of companies surveyed have preference for tool and die as their first priority, 17.6 percent for electronics, 17.5 percent for instrumentation (flow process), 15.4 percent for pipe and high pressure welding, 14.3 percent for chemical technology, 6.6 percent for mechanical draughting with CAD, 2.2 percent for surface mounting technology, 1.1 percent for rigging and scaffolding, 1.1 percent for high precision laser cutting, and 0.0 percents for non-destructive testing (Table 12).

Table 12: Technical courses for 1991 and 1995 in terms of highest priority/ranking by industries

| Typor of Courses | Percentage (1991) | Percentage (1995) |
|--------------------------------|-------------------|-------------------|
| Tool and die | 25.3 | 20.8 |
| Instrumentation (flow process) | 17.5 | 17.7 |
| Mechanical draughting with CAD | 6.6 | 7.3 |
| Rigging and Scaffolding | 1.1 | 0.0 |
| Pipe and high pressure welding | 15.4 | 13.5 |
| Surface mounting technology | 2.2 | 2.1 |

Table 13: (Continued)

| Types of Courses | Percentage (1991) | Percentage (1995) |
|------------------------------|----------------------|----------------------|
| High precision laser cutting | 1.1 | 1.0 |
| Chemical technology | 14.3 | 12.5 |
| Basic electronics | 17.6 | 18.7 |
| Non-destructive testing | 0.0 | 1.1 |

For 1995, 20.8 percent of companies surveyed have preference for tool and die as their first priority, 18.7 percent for electronics, 17.7 percent for instrumentation (flow process), 13.5 percent for pipe and high pressure welding, 12.5 percent for chemical. 7.3 percent mechanical draughting with CAD, 2.1 percent for non-destructive testing, 1.0 percent for high precision laser cutting, and 0.0 percent for rigging and scaffolding (Table 12).

CONCLUSIONS

Based on the findings, below are the courses (in terms of priority) demanded by a majority of companies surveyed:

For 1991:

1. Tool and die
2. Basic Electronics
3. Instrumentation (flow process)
4. Pipe and high pressure welding
5. Chemical technology
6. Mechanical draughting with CAD
7. Surface mounting technology
8. High precision laser cutting
9. Rigging and scaffolding
10. Non-destructive testing

For 1995:

1. Tool and die
2. Basic Electronics
3. Instrumentation (flow process)
4. Pipe and high pressure welding
5. Chemical technology
6. Mechanical draughting with CAD
7. Surface mounting technology
8. Non-destructive testing
9. High precision laser cutting
10. Rigging and Scaffolding

RECOMMENDATIONS

Based on the study, it is recommended that the existing training institutions should consider offering the following four new courses which are preferred by the industries surveyed in Johor based on the results of the survey:

- a. Tool and die
- b. Basic electronics
- c. Instrumentation (flow process)
- d. Mechanical draughting with CAD

In order to conduct the aforementioned courses effectively, the following recommendations are proposed:

1. The training staff of the existing technical training institutes should upgrade their expertise and knowledge in order to be better instructors and impart relevant skills and knowledge to trainees. The training staff are recommended to undergo either
 - a. Industrial attachment programme: or
 - b. Further studies/education/training and retraining (locally and abroad)
2. The equipments and facilities available should also be upgraded. In this context the Penang Skills Development Centre would work best whereby the proximal manufacturing firms will loan some of their equipments and facilities to the training institution. This would familiarize trainee technicians with the latest equipment and technology, thus resulting in the attainment of critical mass.
3. Most of the existing technical training institutions' premises should also be redesigned to provide a realistic and practical atmosphere for technical training, i.e. the building structure should be similar to a factory layout.
4. The public Services Department should review the schemes of services of training staff in government-sponsored training institutions by considering remuneration which commensurate with the market rates, better promotion and career prospects as well as more flexibility in the schemes of services⁵.
5. Courses syllabi should be revised from time to time to incorporate latest technique and technologies currently utilized by industries. Members from the industrial sector should be consulted to joint develop the syllabi and curriculum.

Justification

Johar is going to be a major industrialized state in the future. Plans are developed to emphasize on high technology industries. Such shifts would require a change in requirements of skills by industries. Since electronics industry is dominant in Johor, demands will always exist for electronic technicians.

With the advent of automatic and flexible engineering, the demand for technicians with skills in tool and die and instrumentations (flow process) should also be considered. Therefore it is partially justified for the existing training institutes to venture into tool and die, basic electronics and instrumentation (flow process) courses.

Furthermore, the following observations (from Table 13) support the researcher's recommendations for the offering for the aforementioned courses :

1. Projected demand for tool and die technicians in 1995 is the second highest.
2. Projected demand for basic electronics technicians in 1995 is the highest.
3. Projected demand for instrumentation (flow process) technicians in 1995 is the fourth highest
4. However, the projected demand for technicians with mechanical draughting and CAD background in 1995 is the third highest (Table 13) although ranked sixth in terms of priority (Table 12) indicating the future importances of computer usage in technology for the Malaysian manufacturing industry.

As a start, the existing technical training institutes such as Institute Latihan Perindustrian, Institute Kemahiran MARA, Pusat Latihan Belia Sekudai and the two branches of Pusat Latihan Kemahiran at Kampung Ungku Mohsin and Bukti Senyum should reassess their emphasis on the type of courses that

Table 14: Projected Demand for Technician According to Skills

| Types of Skills | Quantity (1991) | Quantity (1995) |
|--------------------------------|--------------------|--------------------|
| Tool and die | 575 | 1105 |
| Instrumentation (flow process) | 445 | 695 |
| Mechanical draughting with CAD | 505 | 785 |
| Rigging and scaffolding | 235 | 40 |
| Pipe and high pressure welding | 450 | 665 |
| Surface mounting technology | 150 | 175 |
| High precision laser cutting | 40 | 110 |
| Chemical technology | 185 | 355 |
| Basic electronics | 1480 | 2270 |
| Non-destructive testing | 80 | 80 |

they are offering. Some of these institutes have already conducted electricals electronics training courses. Perhaps a larger quota should be all allocated for trainee technicians in this courses.

Table 13: Projected Demand for Technician According to Skills

Since tool and die trades have the highest priority in accordance to the survey, one of the aforementioned institutes or a private sector should start a courses on tool and die.

Tool and Die Trades⁶

The quality of a wide range of product from desk top computers to industrial electronic equipment and from compact disc players to sophisticated medical equipment, depends a lot on the manufacturing processes and tool employed in producing their parts and components. The competitiveness of these products and components in international markets have a lot to do with the quality of tooling requirements and efficiency of the processes employed in manufacturing them.

The contribution of the tool and die industry in the industrialized countries cuts across the whole manufacturing sector. The growth of this industry must commensurate with the development strategy and plans of the Johore State Government for the various industries. There is a need to develop the tool and die capabilities as an important part of Johore's industrial development policy and strategy.

In order to sustain an continue to develop the manufacturing industries in areas such as electronics, computer related equipment, household articles, precision engineering products etc.; and to promote Johore as a regional resoure centre for toold and components, it is impreative for Johore to develop a recognized tool and die industry. To reaffirm this points, a study by PBS showed that only two out of the estimated 85 tool and die establishments in Malaysia were located in Johor⁷.

Size of Tool and Die Industry⁸

The present qualified tool and die experts in Malaysia is estimated to be approximately 1000. This include tool and die makers, machinist involved in making and repairing of tools and personnel in the planning and design of tools. With the increase in the electronics and computer related industry coupled with demands for regional and international purchasing of tooling and components, the tool and die industry in Johore will experience a serious shortage of skilled tool and die personnel from mod '95 onwards.

A survey carried out by GSDC shows that in industrialized countries such as Germany, Switzerland or Japan, 1% of the total working population is employed in the tool and die industry. In the US there are only 0.5% employed.

Singapore has approximately 4000 trained tool and die markers and has projected by the year 2000 an

output of 8000 tool and die workforce to meet their projected demand. The Economic Development Board Training Centres were expanded in 1990 with the focus on tool and die training.

Since the tool and die industry is of strategic importance to Johore and it is envisioned to attract high value-added investments to the state, effort to set-up and produce more precision engineering specialists should therefore be a key issue for Johore to ponder in its quest for industrialisation by the year 2005⁹.

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6. *Industrial Development Opportunities and Constraints in Johor State*, Perundingan Bersatu Sdn. Bhd. unpublished report, Johor Bahru, 1990.
7. The first three paragraphs from this section is adopted from *Industrial Institute: Johore, Malaysia*, confidential proposal plan, MAHO Machine Tools (SEA) Pte. Ltd., 1992.
8. It is interesting to note that Johore intends to be an industrialised state by 2005. Refer Chapters 5 and 6 *Kerajaan Negeri Johor Darul Takzim's Plan Ekonomi Negeri Johor 1990-2005* by Institute Penyelidikan Ekonomi Malaysia (MIER), 1989.