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**Programme des études sur les
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Rapport de recherche**

TECHNOLOGICAL CHANGES AND THE DEMAND
FOR SKILLED MANPOWER IN CANADA

by

Stephen G. Peitchinis
Department of Economics
University of Calgary

January 1980

#67



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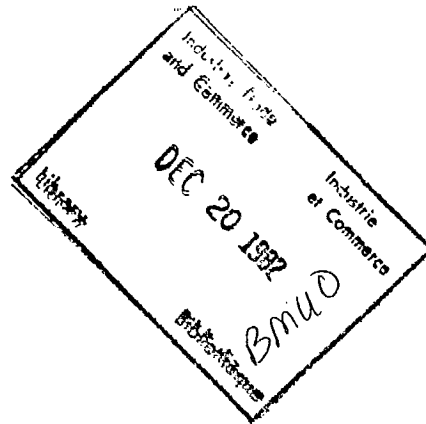
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The views and opinions expressed in this report are those of the author and not necessarily the Department of Industry, Trade and Commerce.

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STUDIES ON THE EMPLOYMENT EFFECTS OF TECHNOLOGY

Technological Changes and the Demand for Skilled Labour

I. INTRODUCTION

This study is a supplement to the 1978 study on The Effect of Technological Changes on Educational and Skill Requirements of Industry.^{*} It was prompted by questions regarding the present state of demand for skilled manpower by Canadian industry, and the ways in which industry attempted to meet that demand.

In the 1978 study we reported on a general impression that most companies did not seem to have manpower problems, and that a number had indicated that technological changes were taking place gradually, permitting satisfactory manpower adjustments. But, the information made available to us did not provide an adequate basis for specific conclusions. For example, we did not have information on the extent to which industry met its manpower requirements through its own training programmes; the extent to which industry depended on manpower from other countries; the extent to which it relied on the domestic labour market (educational and training institutions, and training programmes of other companies); and information on the factors which are deemed to impede industry in the establishment of its own training programmes.

^{*} By Stephen G. Peitchinis, The University of Calgary, for the Department of Industry, Trade and Commerce, Technology Branch.

In an effort to obtain information on these and other issues we mailed a questionnaire to 370 companies and entered into correspondence and interviews with a number of personnel managers during the summer of 1979. We had a 60 percent response to the questionnaire. The data and other information provided by respondents lead to four major conclusions:

- (a) There is serious scarcity of certain categories of skilled workers. Since the work performed by some of these workers is highly specialized, the vacancies cannot be filled through up-grading of unskilled or semi-skilled operatives, nor can the work be done by capital equipment. As a result, some companies have had to turn down orders, and others lost potential orders because they could not guarantee delivery by given dates.
- (b) Companies carry out considerable training on an ad hoc, unstructured basis. For the most part the training is job-specific, short term, and it is provided by other workers and supervisors.
- (c) More training would likely take place in industry, including formal and structured training, but for the small numbers that small and

medium sized companies wish to have trained,
and for the costs involved in the establish-
ment and operation of training programmes.

Small and medium sized companies do not have individually the numbers of potential trainees that would make-up an optimum size class.

This suggests the need for multi-company cooperative programmes that would meet the requirements of a number of firms. Some such cooperative arrangements were reported in existence, and indications are given of willingness to cooperate in the establishment of more programmes. There is general recognition that industry-wide or multi-firm training programmes provide a potentially satisfactory source of skilled manpower, particularly for the small and medium sized firm which cannot establish its own programmes. One of Canada's major companies provided the following response to the question of industry-based training: "Not enough employers are training tradesmen. Generally speaking, employers are grumbling about the shortage but are prepared to "steal" skilled help from other employers rather than train their own. They argue that training is too expensive, especially

when the graduates are likely to be "stolen" by some other employer. ... Either employers are going to accept collective responsibility for the problem and collectively cooperate in the solution, or governments will have to financially penalize those who fail to train ..."

- (d) Most programme costs of company-based training are borne by the companies themselves. Some cost-sharing takes place with the federal government, provincial governments, equipment manufacturers, and others, but the majority of respondents noted that such sharing is limited to specific programmes, and it constitutes a relatively small proportion of total training costs.

II. SUMMARY AND CONCLUSIONS

1. The demand for skilled manpower continues to rise despite the increasing conversion of production processes to electronic technology. The predictions of a few years past that the advent of electronic technology will gradually reduce the demand for traditional, mechanically based, skills have not materialized, and indications are that they are not likely to materialize over the near (10-year) future. Instead of a gradual emergence of surpluses, Canadian industry at large is experiencing serious shortages of tool and die makers, precision machinists, industrial mechanics, specialty welders, instrument technicians, electrical mechanics, metal workers, and other.
2. Shortages of skilled manpower appear to be widespread: they are reported from generally high unemployment markets and low unemployment markets; by small, medium-sized and large companies; in metal manufacturing, aircraft and aircraft parts manufacturing, mining, construction, the automobile industry, machinery and equipment manufacturers, and others. Most seriously affected are companies which do not have apprenticeship programmes, companies which are located at some distance from major population centres, and industries such as oil and gas, pipelines, aircraft and aircraft parts manufacturers who are enjoying high and rising demand for their outputs.

3. Amongst the factors accounting for the shortages, the following were given prominence by responding companies:

(a) Management's failure to manage its manpower resources.

As The Economist* stated in relation to emerging shortages of skilled manpower in Britain, "When vacancies remain unfilled for a long time, this is often more indicative of a shortage of competent management than of skills." If management were to manage the manpower requirements with the effort, attention and analysis that is applied towards the management of finance, marketing, inventories, materials and capital equipment, there would be no manpower problems.

Although some important exceptions can be cited, most of the training that is provided by Canadian industries is ad hoc and limited to on-the-job training of operatives. The training of tradesmen is for the most part left to educational and training institutions and to the industries of other countries.

(b) The second major factor to which shortages of skilled manpower are attributed is the decrease of supply from external sources. Respondents indicate that this

* August 4, 1979, pp. 48-49.

was not unexpected: yet, looking back four to five years, which is the period required for the training of a journeyman, there is no evidence of counter-balancing policy measures to create alternative sources of supply. The conclusion is that even though supply from external sources has been declining, industry has been sufficiently successful in its recruiting efforts to continue its reliance on those sources.

(c) Provincial jurisdiction over apprenticeship programmes

is generally regarded as a market imperfection and an obstacle to the effective utilization of the available supply of skilled manpower. The problem is found not so much in the jurisdiction, as in the failure of the provinces to cooperate in the setting of uniform training standards and in the establishment of common certification standards.

(d) Related to provincial jurisdiction, is the predominantly institutional concentration of apprenticeship programmes.

The majority of respondents expressed the opinion that industry-based training will provide higher quality training and will retain a larger proportion of trainees than has been the experience with institutional programmes. "Impatience with the length of training" and "dissatisfaction with the quality of instruction" were the main reasons given for the relatively high drop-out rates.

- (e) The fifth factor held responsible for the shortages is "the absurdly long periods of apprenticeship training." The requirement of 3 to 4 years of apprenticeship is regarded by many unnecessarily long, contributing significantly to the holding down of supply.
- (f) A factor to which frequent reference is made as limiting the rate of increase in supply is the apprentice-journeyman ratio. Such ratios vary from programme to programme, but it is not unusual to find ratios of one apprentice to six or seven journeymen employed. This can be highly restrictive, and can impede efforts to increase the number of trainees.
- (g) The seventh factor to which a number of major companies attributed significant influence on the supply of skilled labour is the level of wage differentials between unskilled workers, operatives and skilled workers. The evidence indicates that in many industries the wages of tradesmen have fallen down to a range of 1.30 - 1.40 times the wages of unskilled workers. It is assessed that such narrow differentials do not provide sufficient incentive to potential trainees to enter the long and arduous apprenticeship programmes.

(h) Finally, a number of firms complained that their training programmes were inhibited by red tape, costs, problems with unions, and the normal practice of some firms in "stealing" trainees upon completion of their programmes by paying higher wages. Instead of investing in training programmes, some firms elect to allocate the cost of training into higher wages and improved working conditions.

(i) As a partial solution to the problem indicated in (h), it was suggested that government impose a levy on all firms employing skilled labour and use the proceeds to subsidize industry training.

III. FACTORS ACCOUNTING FOR SCARCITY OF SKILLED WORKERS

The available evidence suggests that generally industry places relatively low priority to skill training. There are many so-called training programmes, but these are for the most part process-specific on-the-job training of operatives, retraining of employees on transfer from job to job, upgrading of employees to fill positions that cannot be filled from the market, and orienting skilled employees to company-specific processes.

A number of reasons have been suggested for the unwillingness of management to commit more resources to general skill training:

- (a) The traditional reliance on immigration and educational and training institutions to supply the required skills. Even during periods of very rapid expansion and change in the economy, these two sources supplied the required manpower. There is general recognition now that industry should no longer rely on immigration to supply the required skills.

As the gap in living standards and employment opportunities between Canada and the traditional foreign suppliers of skilled manpower, i.e. Britain and Western Europe, began to narrow, it was generally expected that the inflow would decrease. But, industry continued to hope that the government will

manipulate its immigration policy in favour of manpower, and educational and training institutions will respond to the anticipated changes in demand and initiate appropriate programmes. The evidence suggests that the government has pursued an accommodative immigration policy. Indeed, perhaps more accommodative than the long-term interests of the nation would justify: had the policy been less accommodative, industry would have been forced to institute training programmes. Also, a less accommodative immigration policy, would have forced industry, educational and training institutions, and the provinces to cooperate and remove or reduce some of the historical jurisdictional barriers that impede the training process.

- (b) Provincial jurisdiction over apprenticeship programmes is generally regarded as an impediment to skill training and the efficient utilization of skills. Different certification standards inhibit inter-provincial mobility, and thereby contribute to the concurrent existence of surpluses in some provinces and scarcities in other. Common certification standards are not likely to be agreed upon without prior agreement on the sharing of training costs. As long as some provinces are suspected of under-investing in training relative to their requirements, other provinces will continue to use certification

for the protection of their investment in training.

This is essentially the same argument as that used by individual companies for limiting their training to process-specific work functions.

Evidently, provincial jurisdiction has its price:

it is the foregone output represented by manpower surpluses in some provinces and scarcities in other; the costs of delays in the undertaking and completion of projects; and the rapidly escalating wage payments in provinces experiencing serious scarcities. The question arises whether the political benefits offset sufficiently the economic costs to justify continuing tolerance of provincial intransigence.

The common good dictates some form of cooperation and coordination of effort. Since industry as well as governments are involved in the training process, the coordinating role must necessarily be assumed by the federal government

- (c) Generally, management has not regarded manpower development its responsibility: its concept of the manpower (Personnel) function has been one of search for qualified employees, the negotiation of terms and conditions of employment and the administration of employment contracts. There are exceptions, of course, and one

such exception is the following response to our enquiries on the subject: "We have always anticipated that any skilled people we needed would have to be developed through our own training programmes. If we do our manpower planning properly, we really foresee no problems." The implication of this statement for industry at large is that if supply problems are to be minimized, industry must, individually and collectively, assume greater responsibility for manpower development.

- (d) Another factor contributing to the reluctance of management, particularly management of relatively small companies, to invest in manpower training is the risk factor. Unless the training is company process-specific and the skill-knowledge has no market value, the company that invests in manpower training takes a risk of losing its investment to competitors in the labour market. To the extent that some companies are free not to do any training and not to participate financially in the training of skills they employ, those that do assume a risk. And the larger the number of companies that do not, the greater the investment risk of those who do. Rather than assume such a risk, many admit to the allocation of part of the funds that would have been invested in training to search

of domestic and foreign markets, and in some instances into somewhat higher wages than those paid by companies with training programmes.

- (a) Some companies reported that the small numbers of skilled workers they required did not warrant the establishment of their own training programmes. But, they indicated willingness to commit some resources towards skill training, if cooperative arrangements could be organized with other firms or technical institutions. This suggests that the existence of multi-company cooperative training programmes would facilitate the participation of small companies which otherwise would rely on the market for skill needs. Furthermore, cooperative arrangements would expose trainees to a broader range of processes and equipment, and thereby facilitate broader training than could be provided by the average company by itself.

Our investigation indicates a consensus amongst those responsible for industry manpower that industry can and should do more manpower training. Two forms of industry-wide participation in training programmes were suggested:

- (1) a government levy on all firms employing skilled labour, the resulting revenue to be allocated towards an increase in the supply of required skills from existing training programmes, and from newly funded industry-based programmes; and

- (2) some form of joint arrangement amongst firms having similar skill needs that would lead to the establishment of industry-supported and industry-based cooperative training programmes.

The first is intended to remove the risk element from company initiated and company funded programmes; whereas the second is intended to facilitate the creation of optimum size training classes, and to establish a more direct relationship between the nature of programmes, the in-take of trainees in each programme, and the existing and anticipated requirements of industry. One respondent to our enquiries wrote:

"We knew we could develop top quality programs, locate the appropriate instructor and provide a training room setting for sessions. The major difficulty was we could not fill the seats to make up a reasonable size class on our own. Initially we talked to three neighboring ... operations ... which ... gave us five large similar industry groups. ... They have many of the same training needs ... and we provided them the opportunity to get class time that would not otherwise be available. The Multi-Employer program has developed to the point where we offered 16 weeks of Electrical Training (Basic, Advanced and Power Distribution), and 11 weeks of Operator Training ... We foresee two new Electrical programs for 1980, one in the area of 'Flow Measurement' and the other, 'Maintenance Principles of Computer Hardware and Micro Processors'."

Such cooperative arrangements have the further advantage of providing broader practical experience to trainees than can be provided by relatively small companies individually.

IV. OTHER FACTORS ACCOUNTING FOR THE SCARCITY OF SKILLED WORKERS

1. The significant narrowing of wage differentials between skilled workers, operatives and unskilled workers is held to be an important contributor to the increasing scarcity of skilled workers. In many industries the monetary incentive has been almost removed from the decision to acquire a skill. But, opinion is divided on the matter: for example, one of our major companies, in which the wages of skilled workers average only 1.20 - 1.30 times the wages of the unskilled, wrote:

"the Company has experienced difficulty in recruiting tradesmen in certain fields, ... the difficulties arise not from narrowing wage differentials, but more so from the intense construction and industrial activity in effect locally. ... efforts to acquire a trade are significant. A case in point is our recent posting, announcing the Company's acceptance of applications for apprenticeships, yielding the submission of over 900 applications in a two week period. From our perspective, then, the incentive to acquire a recognized and marketable skill is appreciated and avidly sought ..."

Another major company, in which the wage of "A" level tradesmen is only 1.30 times the wage of labourers wrote: "our Company has not had any great difficulty in securing skilled personnel ... However, the major reason for our ease in securing skilled labour is the result of the differential that exists between the skilled wage paid by us and that

paid by the majority of other employers in the ... district."

This perhaps provides a partial explanation for the difficulties encountered by some firms in securing skilled labour: the real problem may be the payment of non-competitive wage rates to skilled workers, and not the size of wage differences between skilled and unskilled workers.

2. The lack of cooperation between and coordination in the activities of equipment designers, engineers and personnel managers is often held to be a factor in the periodic emergence of lags in the supply of skilled manpower, particularly during periods of rapid changes in technology. Apparently equipment designers and engineers are not required to consider the manpower implications of new machinery and equipment and of changes in production processes. Some engineers have alleged that it is not possible to determine the actual effects on worker skills and on the numbers of workers until installation and the commencement of operations; whereas others admitted that their primary responsibility was to design more efficient processes, the responsibility for manpower lay elsewhere. Neither of these postures can be viewed as socially responsible. Although it is difficult to detail the effects on manpower in advance of implementation, particularly the effects on manpower to be employed upstream and downstream

of the process, with experience it should be possible to approximate the effects. The issue has not been one of inability of engineers and manpower specialists to deal with the manpower problems of technological changes; it is rather management's failure to assign such a responsibility.

3. A casual reference was made to the possibility that the institutional bias of provincial governments in the financing of skill training may be responsible for the supply difficulties. If more funds were made to industry, and if permanent cooperative arrangements were to exist between industry and institutions, more effective programmes could be established. The highly favourable reports emanating from Europe and Japan, where training is predominantly industry-based, suggest that we should perhaps re-examine the effectiveness of our predominantly institution-based training system.

V. INSTITUTIONAL VERSUS INDUSTRY TRAINING

1. A bias in favour of institutional training is manifested in the relative proportions of trainees started (Table 8), and in the expenditures allocated to institutional programmes and industry training (Table 7), under the Canada Manpower Training programme. The allocation of trainees amongst programmes, and the allocation of expenditures, are interpreted to manifest the opportunities for training made available by the provinces, and not necessarily the preferences of the trainees, the requirements of industry, or the training effectiveness of the respective programmes. It is generally believed in industry that if there were well organized and comprehensive educational-training programmes in industry at large, more trainees would have entered training programmes than has been the experience under the existing system. This suggests that limited choices rather than trainee preferences have dictated the distribution between institutional and industrial programmes.
2. Institutional training provides skill knowledge, classroom apprentice training, and basic knowledge for skill development; it does not provide practical training, and most importantly, it does not provide the discipline of the workplace, which appears to be a very significant variable in the establishment and maintenance of a stable and efficient

labour force. Since most of those who enter the training programmes are unemployed and new entrants into the labour market, it would be to their advantage from the standpoint of their employment upon completion of the training programmes, if they were to take their training in work environments that they would encounter in employment.

Educational institutions do not approximate the environment in work places, regardless how closely they may approximate the work activity itself. Yet, the work environment--interpersonal relations, supervision, time schedules, etc.--is a very important element in the work process. This suggests that industry training should perhaps be given higher priority than has been the case heretofore.

3. Ideally, both institutions and industry should be involved in each programme: the institutions should provide the classroom work, and industry should provide the practical application. If students were to alternate between classroom and the work-place over intervals appropriate to each programme, all parties to the training process would benefit: students will emerge with a proper balance of theoretical and practical knowledge; institutions will be kept up-to-date on the practical aspects of the training process; and industry will be kept up-to-date on the fundamental principles that

underlie work processes.

4. Our evidence indicates that most employers are willing to provide the training they require for their processes, even if it were to involve some basic classroom instruction. The cardinal considerations in the undertaking of training by industry appear to be: (i) whether the numbers of potential trainees justify the establishment of a programme; and (ii) whether it can reasonably be expected that the trainees would remain in employment with the enterprise that provides the training long enough to capture the investment in education and training. When the numbers are few; when basic skills are required; and when workers are industry-mobile, the tendency would be to favour the establishment of institutional training. Whereas, when the numbers required by enterprises are substantial; when training is a recurring and continuous activity; and when training is job-specific, the training would be industry-based.
5. As indicated at the beginning of this report industries do conduct considerable training. Some of their programmes are of relatively short duration, and involve largely administrative, professional, technical and office personnel; and some are job-specific programmes, related to major changes in production processes. In addition, considerable on-the-job learning takes place, which is not formulated into "programmes"

and therefore not designated as "training": the orientation of workers transferred from one activity to another; the orientation of new workers through different stages of processes; and adjustment by workers to changes in processes, all require learning on-the-job. Such learning, which in most instances is work practice under supervision, tends to continue until the worker attains some standard norm of proficiency.

Hence, the reported employer-sponsored training programmes are those which are formulated as "programmes" in content and are offered over specified periods of time. On-going learning activities, and adjustments to changes in technology and processes, are generally regarded as part of the work activity, and are not reported as training programmes. A common response to our enquiries about skill adjustments to technological changes has been that "technological development is an on-going matter and people are learning continuously ..."

6. Another element that seems to favour industrial training is programme costs (Table 1): in 1977 the average cost per industry trainee was almost one-half the cost per institutional trainee. In some provinces, such as Newfoundland, New Brunswick, Manitoba and Alberta the cost was one-third or less.

TABLE 1

Canada Manpower Training Programme: Cost per Trainee, by Province,
1977-1978

	<u>Cost per Institu- tional Trainee (full & part- time).</u>	<u>Cost per Indus- trial Trainee.</u>	<u>Total Training costs per Trainee.</u>
Newfoundland	\$ 2,666	\$ 779	\$2,185
P.E.I.	1,804	1,051	1,608
Nova Scotia	2,353	1,084	1,971
New Brunswick	2,338	882	1,813
Quebec	1,768	1,013	1,629
Ontario	2,757	1,601	2,507
Manitoba	2,231	717	1,758
Saskatchewan	2,105	1,122	1,847
Alberta	1,954	607	1,784
N.W.T.	1,892	1,273	1,711
British Columbia	1,998	1,023	1,717
Yukon	2,319	864	1,728
Total Average:	<u>\$ 2,146</u>	<u>\$1,101</u>	<u>\$1,911</u>

Source: Calculated from the Department of Employment and Immigration,
Annual Report 77-78.

Account must be taken, of course, of the differences in institutional and industrial programmes, and of the net training costs that are incurred by industries. Our survey evidence suggests that federal government allocations constitute only part, and in many instances a small part, of the training costs incurred by industry. Nevertheless, considering that the costs incurred by industry may be viewed as an investment in human capital which will yield a stream of returns, industry training appears to have a cost advantage.

7. Another possible explanation for the relatively low cost per trainee in industrial training programmes is the high level of unemployment that prevailed in 1977-78. Training costs should vary inversely with the level of unemployment: they should be low when unemployment is high and rising; and high when unemployment is low. In periods of high unemployment employers have more choice in the selection of workers they take on, and it can be assumed that, on the average, they will select those workers whose personal characteristics indicate less expenditure on their training. The young, the better educated, the healthy will be taken off the queue,¹ and the remainder will be left for jobs that do not require training.

8. This proposition has implications for the training process:

¹This issue is examined by Lester C. Thurow in Generating Inequality, Basic Books, Inc., New York, 1975, pp. 75-97.

presumably each enterprise will select potential trainees on the basis of the nature of processes it has, and the nature of personal characteristics that are deemed most suitable for those processes. Given the opportunity to choose freely, enterprises would choose the most suitable candidates for each training programme--those who will be least costly to train. This suggests that individual enterprises are potentially more effective in the selection of prospective trainees than would be public institutions and agencies. The latter cannot be as specific in relating the characteristics of prospective trainees to work processes, and commonly are not as free in the selection of candidates. Public pressures to "give a chance" to all who may wish to enter training programmes result in the acceptance of trainees who do not possess appropriate characteristics, leading to high rates of attrition, the lengthening of programmes, lower quality of training and higher cost per trainee.

VI. QUESTIONNAIRE ON SKILL TRAINING BY CANADIAN INDUSTRY

1. In June 1979 we mailed the appended questionnaire to 370 companies. By the date of writing we received 223 responses, which represent a response rate of 60 percent.
2. The main purpose of the questionnaire was to determine the extent to which companies engaged in the training of labour, and who bore the cost of training.
3. The responses to the questionnaire, and some of the comments of the respondents, indicated the desirability to pursue certain issues beyond the provisions made in the questionnaire. This resulted in interviews and correspondence, with specific reference to the scarcity of skilled labour and the factors which may account for that scarcity.

4. Characteristics of Respondents

TABLE 2

Manpower Training July 1979 Survey: Responding Companies
by Number of Employees

Number of Employees	Number of Firms	% of Total Firms
0 - 489	74	33.2
500 - 999	60	26.9
1000 - 1999	36	16.1
2000 - 2999	17	7.6
3000 - 4999	16	7.2
5000 - 9999	12	5.4
10000 - and more	8	3.6
TOTAL	223	100%

Source: Stephen G. Peitchinis, Department of Economics,
The University of Calgary.

TABLE 3

Manpower Training July 1979 Survey: Responding Companies
by Province

Province	Number of Firms	% of Total Firms
British Columbia	14	6.3
Alberta	5	2.2
Saskatchewan	4	1.8
Manitoba	6	2.7
Ontario	156	70.0
Quebec	33	14.8
Nova Scotia	4	1.8
New Foundland	1	0.4
TOTAL	223	100%

Source: Stephen G. Peitchinis, Department of Economics,
The University of Calgary.

TABLE 4

Manpower Training July 1979 Survey: Responding Companies
by Industrial Classification

Industry	Number of Firms	% of Total Firms
Mining	7	3.3
Construction	5	2.3
Manufacturing	186	86.5
Transportation, Communication and other public utilities	10	4.7
Wholesale and retail trade	3	1.4
Finance, Insurance & Real Estate	3	1.4
Miscellaneous	1	0.4
TOTAL	215	100%

Source: Stephen G. Peitchinis, Department of Economics,
The University of Calgary.

5. Analysis of Results:

(a) Sources of qualified manpower.

Companies were asked to indicate the ways in which they met their needs for qualified manpower: trained their own, hired in the domestic market, hired in foreign markets on a permanent basis, hired in foreign markets on a temporary basis. The results are given in Table 5. Just over one-half of respondents (52.9%) indicated that they trained their own and hired trained workers in the domestic market; 17.5 percent trained their own and hired trained workers in both the domestic and foreign markets; 17.5 percent did not train any, relying instead entirely on the domestic market; 7.6 percent relied entirely on their own training; and 3.6 percent utilized all sources—trained their own, hired in the domestic market and hired in foreign markets both permanent and temporary employees.

(b) Location of Training Programmes.

Companies were asked to indicate whether they conducted their training "in-house" or at some external facility. Close to 60 percent indicated that training was done primarily "in-house," whereas about 40 percent used a variety of external facilities.

Many of the companies which used primarily their own

TABLE 5

Sources of Qualified Manpower: (July 1979 Survey)

	No. of Companies	% of Respondents
(1) Trained Their Own	17	7.6
(2) Hired in the Domestic Market	39	17.5
(3) Hired from Foreign Countries on a Permanent Basis	1	0.4
(4) Hired from Foreign Countries on a Temporary Basis	-	
(5) Both (1) and (2)	118	52.9
(6) (1), (2) and (3)	39	17.5
(7) (1), (2), (3) and (4)	8	3.6
(8) (1) and (3)	1	0.4
TOTAL	223	100%

Source: Stephen G. Peitchinis, Department of Economics,
The University of Calgary.

facilities indicated that occasionally they used the premises of colleges, those of associated companies, hotel and convention facilities, training centres, job sites, and the premises of suppliers.

Amongst the external facilities used by companies which did not indicate "in-house" training, the most frequently mentioned were educational and training institutions, followed by equipment manufacturers, and facilities of parent company.

(c) Who Provided the in-house Training.

- (i) Almost all of the responding companies (92%) indicated that their own supervisors and other workers provide most of the training instruction.
- (ii) About 28 percent indicated that occasionally they use outside instructors for some of the training programmes.
- (iii) Four percent indicated that they employ permanent training officers and instructors.
- (iv) Two companies indicated that the training was provided in-house by parent company personnel.
- (v) One company indicated that the equipment manufacturer provided the training.

(d) The Cost of Manpower Training by Industry.

Companies were asked to indicate who bore the cost of their training programmes. The responses are given in Table 6:

- (i) The question was answered by 80.3 percent of respondents. 42.5 percent of them indicated that the entire cost was borne by the companies, whereas 57.5 percent indicated that the costs were shared, in varying proportions, with others.
- (ii) Amongst the governments, institutions, and others who shared in the costs of training, the federal government was cited by 66 percent of respondents; equipment manufacturers were cited by 22.3 percent; provincial governments by 23.3 percent; educational institutions by 9.7 percent; and the workers involved in training were cited by 11.7 percent of respondents.
- (iii) The responses indicate that the sharing in costs varies with the nature and purpose of the training programmes:

Generally,

- the costs of routine on-the-job training

and upgrading are absorbed entirely
or largely by the companies themselves;

- the costs of apprenticeship programmes
are usually shared with the federal
government;
- cost of training for the operation of
new equipment are frequently shared
with the equipment manufacturer;
- the costs of other programmes are shared
with provincial governments, participating
workers, educational institutions, employer
associations and trade unions.

We did not ask companies to indicate in what proportions
were costs shared. But, a number of respondents volun-
teered the information that in the case of apprentice-
ship programmes the sharing was in terms of the
difference between CEIC (Canada Employment and Immigration
Commission) allowances and the "normal" weekly earnings
of apprentices; and an equal number commented that the
federal government share was "minor," "limited," "Involved
one program only," or was too small to encourage the
undertaking of training programmes by industry.

TABLE 6

Cost Sharing of Industry Training Programmes:
(July 1979 Survey)

	References to <u>all</u> Programme Costs		References to Sharing of Programme Costs	
	No.	%	No.*	%
Total Responses to Questionnaire	179	100.0	179	100.0
Company	76	42.5	96	53.6
Federal Government.	1	0.6	68	38.0
Provincial Governments.	1	0.6	24	13.4
Equipment Manufacturers	1	0.6	22	12.3
Educational Institution	1	0.6	10	5.6
Participating Workers	1	0.6	12	6.7
Trade Union	0	0.0	2	1.1
Employer Association.	0	0.0	3	1.7

*Number of times cited by respondents. Total will exceed the number of responses because of multiple citings by each respondent.

Source: Stephen G. Peitchinis, Department of Economics,
The University of Calgary.

The frequency of participation in cost sharing by governments, agencies and organizations is instructive: evidently, the federal government is the most active participant, even though manpower is constitutionally under provincial jurisdiction. Yet, participation by provincial governments appears to be only occasional and minimal.*

The question arises whether governments, both federal and provincial, should not participate more actively.

The responses indicate that the cost of training is an important explanatory variable for what is recognized to be inadequate training by industry. In the context of the intense competition for skilled labour, and the references to "stealing" workers upon the completion of their training, it is understandable why individual companies would be reluctant to institute training programmes and bear the entire cost or a substantial part of the cost of training.

(e) Participation by Unions in Industry Training Programmes.

- (i) The available evidence suggests only limited involvement by unions in industry training programmes: almost 79 percent of companies responding to the question of union participation indicated no participation; 16 percent

* The amount of funds allocated by the federal government to industrial training in 1977-78 is given in page 45, Table 7.

indicated some form of participation; and
5 percent indicated qualified participation.

Question: Was the Labour Organization
of your Company involved in
any way in the training
process?

"No" 163 78.8%

"Yes". 33 15.9%

Qualified "Yes". . 11 5.3%

Total 207 100%

(ii) We have not attempted to determine the reasons for this limited involvement by unions. Is it that they have not been invited or they have not shown any interest? The most common assumption is that management regards training and retraining to be its responsibility, and does not find it necessary or desirable to involve the union organizations in a formal way. On the other hand, it is quite possible that the unions themselves have not wished to become involved with issues of training and retraining. Although some union representatives have indicated that they are neither consulted nor informed in advance of the nature and scope of training and

retraining that is being planned by their companies, the matter of training and retraining does not appear amongst union designated issues for negotiation, except as a general condition in relation to accommodative adjustments to technological changes. This can be interpreted to suggest that unions, excepting perhaps craft unions, do not regard training and retraining a matter of high priority.*

(iii) Amongst the unions that were indicated to be involved in the training process, the majority have participated in the design of training programmes. Most of the remainder appear to have limited their participation to the negotiation of agreement for training after working hours.

(iv) Amongst companies which qualified their "Yes" response, the majority indicated that union participation was limited to the apprenticeship programme. The following qualifications were given:

- union represented on Committee selecting apprentices
- union monitors progress of apprentices

* More will be said on this issue in our forthcoming report on the Attitude of Unions Towards Technological Changes.

- representation on Committee marking and checking examinations
- participated in decision-making regarding trainees
- on joint company-union-Canada manpower training development programme
- participated in organization of a training programme
- union provides instructors for training programme
- occasional involvement, depending on particular training programme.

VII. PAST SURVEYS OF MANPOWER TRAINING IN CANADA

Canada does not have a systematic and continuous system of surveying manpower training. The Canada Department of Labour conducted five special surveys over the period 1952-1959,² and Statistics Canada carried out four surveys over the period 1963-1973.³

The first three Department of Labour surveys (1952, 1953 and 1954) were concerned with apprenticeship programmes in three manufacturing groups of industries; whereas the 1956 and 1959 surveys were broadened to include non-apprenticeship training, and covered manufacturing, mining, transportation, communication and public utilities. The Statistics Canada studies relate to organized on-the-job training in Canadian industry: a 1963 survey had the same coverage as the Department of Labour surveys of 1956 and 1959; a 1969 survey was broadened to include managerial, professional, and office employees; and a 1970 survey was expanded to include all industry groups, except agriculture, fishing and trapping, public administration and defence.

The latest report available is a Statistics Canada-Department of Manpower and Immigration study based on a sample survey of 30,000 house-

²Canada, Department of Labour, "Plant Training Programs in Selected Manufacturing Industries," April 1952; and "Training and Recruitment of Skilled Tradesmen in Certain Industries in Canada, 1951-1956," June 1957.

³Statistics Canada, Education Division, "Organized In-Service Training in Four Major Industries, 1963," June 1963; "Organized Training in Four Industry Groups, 1963," December 1967; and "Training in Industry, 1969-70," February 1973.

holds in 1973:⁴ it is concerned with employer sponsored training, and contains information on training by age and sex, occupation, industry, province, length of training course, and number of hours of training per week.

In brief, the survey found the following:

- (a) During 1973 about 657,000 or 7.9 percent of all paid workers in the labour force attended employer sponsored training courses;
- (b) Over one-quarter of the 657,000 attended more than one training course during the year.
- (c) Participation in training programmes by age groups indicates relatively low participation amongst the 14-19 age group (3.7%), rising to a peak of 11.2 percent for the 25-34 age group, and declining thereafter down to 3.9 percent for the 55 years and over age group.
- (d) More than one-third (35.6%) of the participants attended training courses of less than two weeks' duration; 21.5 percent attended 2-4 weeks; 13.1 percent 5-8 weeks; 14.3 percent 9-12 weeks; 5.8 percent 25 weeks and over.

⁴"Employer Sponsored Training Programs," The Labour Force, January 1975, pp. 79-86.

- (e) Close to one-quarter (23.3%) of the trainees participated in training activity four hours or less per week; 10.4 percent participated 5-7 hours per week; 13.2 percent 8-14 hours; 8.8 percent 15-21 hours; 6.1 percent 22-28 hours; 8.8 percent 29-34 hours; and 27.1 percent 35 hours and over.
- (f) The highest participation was by employees in public administration (16.9%), followed by employees in finance and real estate (14.5%), and transportation, communication and other utilities (12.1%). The lowest participation was amongst construction workers (3.2%).
- (g) Amongst occupational groups the most active participants were the professional and technical (14.8%), and managerial (13.3%). The least active were service and recreational occupations (5.4%), and craftsmen, production process and related workers (5.8%).

The problem with these special, occasional surveys is that they do not provide a consistent record, and therefore, do not provide a basis for determining the adequacy of what is being done. For example, is the 7.9 percent rate of labour force participation in employer sponsored training courses adequate? Considering that this statistic includes all sorts of programmes, more than one-third of them of less than two-weeks' duration, that proportion seems

rather small. On the other hand, considering that the number is incremental and to some extent cumulative, account must be taken of the proportions that participated in previous years. Furthermore, in addition to employer sponsored training programmes, there are the institutional and industry programmes sponsored under the Canada Manpower Training Programme.

VIII. THE CANADA MANPOWER TRAINING PROGRAMME

1. Number of Participants and Expenditures on the Programme.

In 1977-78 close to 300,000 employees entered training programmes⁵ in institutions and industries under the auspices of the Canada Manpower Training Programme, at a cost to the federal treasury of nearly \$572 million. The distribution of the trainees amongst the programmes, and the allocation of the expenditures between institutional and industrial training is given in Table 7: 23.4 percent started skill training in educational institutions, 23.3 percent entered industry training programmes, 19.2 percent started apprentice training (classroom portion only) in institutions, 14.7 percent entered basic training for skill development (upgrading in mathematical and scientific skills) and 2.7% started with language training.

2. Nature of the Canada Manpower Training Programme

- (a) The Canada Manpower Training Programme is not really a programme of manpower training; it is rather a programme of federal funding of manpower training by the provinces and industry. The Canada Employment and Immigration Commission "purchases" institutional training courses from colleges and vocational schools through

⁵ This number started in the various programmes. On the average about one-half dropped out before the completion of their programme.

TABLE 7

Canada Manpower Training Programme: Distribution of Trainees
Started and Expenditures by Programme, 1977-78.

	<u>Trainees</u>	<u>Started</u>	<u>Expenditures</u>	
	<u>No.</u>	<u>%</u>	<u>\$M.</u>	<u>%</u>
Grand Total	299,377	100.0	572	100.0
<u>Total Institutional Training</u>	<u>229,679</u>	<u>76.6</u>	<u>493</u>	<u>86.2</u>
Full-time Institutional	179,241	59.8		
Skill Training	69,952	23.4		
Language Training	7,936	2.7		
Basic Training	43,960	14.7		
Apprentice Training	57,393	19.2		
Part-time Institutional	50,438	16.8		
 <u>Industrial Training</u>	 <u>69,698</u>	 <u>23.3</u>	 <u>77</u>	 <u>13.4</u>
Training Improvement	-	-	2	.4

Source: Department of Employment and Immigration, Annual Report 77-78,
Appendix 4 and 6, p. 38 and p. 40.

the provincial governments, and contracts with employers and employer associations the establishment of training programmes in industry, and reimburses them for the direct training costs and a portion of the wages of trainees. But, decisions on whether programmes will be offered, their nature, sizes and number, and the allocation of trainees amongst programmes, appear to rest largely with the provinces.

- (b) For example, in Alberta 61.9 percent of trainees started apprentice training in institutions, whereas in Quebec only 3.3 percent of trainees started in institutional programmes (Table 8). Evidently, Alberta placed high priority on apprentice training, whereas in Quebec such training had very low priority. On the other hand, Quebec put high priority on part-time institutional training (42.9% of trainees), a method which is not favoured in the other provinces (except P.E.I.). Therefore, it would appear that the Canada Employment and Immigration Commission purchases not what itself may want but what the provinces want. Acceptance of this proposition would place the burden of initiative and accountability on the provinces. The currently prevailing scarcity of skilled manpower

would mean not that funds were unavailable, but rather that the provinces failed to institute the necessary programmes.

3. Allocation of Expenditures under the Canada Manpower Training Programme.

- (a) The allocation of programme expenditures reveals a strong policy bias in favour of institutional training: of the \$572 million allocated in 1977-78, \$493 million or 86.2 percent were allocated to the provinces for institutional training, and \$79 million or 13.8 percent were allocated to industry training.
- (b) The relatively low priority given to industrial training in some of the provinces (Table 8) warrants examination. It may be justified by the absence of appropriate industries for training, or by the absence of appropriate industry organization for training purposes. An observed difficulty in the development of industrial training programmes is inadequate numbers of prospective trainees in individual companies. If industrial training is to develop effectively, multi-firm cooperative arrangements would have to be organized.
- (c) On the other hand, the allocations between institutions and industries may be mere manifestations of the biases

of those who perform occupational counselling functions, and of those who make decisions regarding the nature of programmes to be offered.

The priorities and biases that are manifested in the distribution of trainees amongst programmes and in the allocation of funds are not necessarily wrong, if they find support in the market for skills. But, in the context of the demand-supply imbalances that are being reported by industry, and in the context of industry comments regarding the nature of some institutional training, an examination of the priorities and biases may be warranted.

4. Trainees by Province under the Canada Manpower Training Programmes.

- (a) We have not been able to determine the basis on which it is established how many trainees will be supported in each province annually under the Canada Manpower Training Programme. It would seem appropriate that for each province there be target figures based on anticipated net requirements. The 1977 figures are given in Table 9: evidently, Ontario had the lowest proportion of trainees to total provincial labour force, and Prince Edward Island had the highest. The question arises, to what extent the relatively low ratio of trainees to total labour force in

TABLE 8

CANADA MANPOWER TRAINING PROGRAM
NUMBER OF TRAINEES STARTED

1977-78

PROVINCE	FULL-TIME PUBLIC AND PRIVATE INSTITUTIONS										INSTITUTIONAL PART-TIME TRAINING		TOTAL INSTITUTIONAL TRAINING		INDUSTRIAL TRAINING		GRAND TOTAL	
	SKILL TRAINING		LANGUAGE TRAINING		BASIC TRAINING FOR SKILL DEVELOPMENT		APPRENTICE TRAINING		TOTAL FULL-TIME TRAINING									
Newfoundland	4,016	37%	1		1,772	16.3%	1,422	13.1%	7,211	66.5%	770	7.1%	7,981	73.6%	2,864	26.4%	10,845	100
Prince Edward Island	1,101	29.8	-		567	15.3	285	7.7	1,953	52.9	722	19.5	2,675	72.4	1,021	27.6	3,696	100
Nova Scotia	4,662	32.2	-		2,002	13.0	2,093	20.0	9,557	66.1	275	1.9	9,832	68.0	4,625	32.0	14,457	100
New Brunswick	3,529	26.8	-		1,232	9.4	3,202	24.4	7,963	60.6	301	2.3	8,264	62.9	4,002	37.1	13,146	100
Quebec	18,484	17.8	3,532	3.4%	14,490	13.9	3,383	3.3	39,889	38.4	44,530	42.9	84,419	81.2	19,486	18.8	103,905	100
Ontario	19,285	28.1	2,545	3.7	13,015	19.0	15,919	23.2	50,764	74.1	2,167	3.2	52,931	77.2	15,593	22.8	68,524	100
Manitoba	3,482	25.5	381	2.8	2,410	17.6	2,778	20.3	9,051	66.2	306	2.2	9,357	68.4	4,316	31.6	13,673	100
Saskatchewan	2,715	25.5	142	1.3	1,592	15.0	2,861	26.9	7,310	68.7	528	5.0	7,838	73.7	2,004	26.3	10,642	100
Alberta	2,072	12.0	645	2.7	2,205	9.6	14,758	61.9	20,560	86.2	142	0.6	20,702	86.8	3,152	13.2	23,854	100
Northwest Territories	261		-		356		240		857		-		857		397		1,254	
British Columbia	9,299	27.2	690	2.0	4,117	12.0	9,651	28.2	23,757	69.4	396	1.2	24,153	70.5	10,093	29.5	34,246	100
Yukon	246		-		122		1		369		301		670		465		1,135	100
CANADA	69,952	23.4	7,936	2.7	43,960	14.7	57,393	19.2	179,241	60.0	50,438	16.8	229,679	76.8	69,698	23.3	299,377	100

Source: Department of Employment and Immigration, Annual Report 77-78, Appendix 6, page 40.

Ontario manifests reliance on immigration to fill emerging manpower gaps. Ontario has been the major beneficiary of immigrant labour, and it seems reasonable to assume that the province is not under as much pressure to train its own manpower as are those provinces which do not have equal access to external sources.

Table 10 contains information on the occupations (intended) of immigrants arriving in Canada and reported vacancies for full-time jobs. A close relationship is evident in most occupational categories. But, there is a well known problem with these statistics: we do not know how many of the immigrants had the indicated occupational skill on arrival, and how many "intended" to acquire such skills. Undoubtedly, some or many prospective immigrants indicated intent to enter occupations in which vacancies were reported, and thereby increase their chances of admission; hence, the close correlation between intended occupations and vacancies.

- (b) There is considerable division of opinion on whether Canada should continue to rely on external sources for specialized manpower to the same extent as heretofore, or whether it should provide educational and training opportunities to its own, to the full extent of the

projected requirements, and use immigration as a supplement and complement whenever the need arises. It may be easier and less costly to import trained manpower than to train, but, the more are imported the less the opportunities for young people to acquire skills and obtain employment. Thus, what may be in the interest of the individual enterprise is not necessarily in the interest of society at large. This is particularly critical for periods of relatively high unemployment.

TABLE 9

Labour Force and Number of Trainees Started,
Canada and the Provinces, 1977

	Labour Force No. '000	Trainees Started- Canada Manpower Training Programme No.	Trainees as % of Labour Force
Canada	10,616	299,377	2.8
Newfoundland	192	10,845	5.6
Prince Edward Island	50	3,696	7.4
Nova Scotia	333	14,457	4.4
New Brunswick	268	13,146	4.9
Quebec	2,792	103,905	3.7
Ontario	4,044	68,524	1.7
Manitoba	460	13,673	3.0
Saskatchewan	421	10,642	2.5
Alberta	892	23,854	2.7
British Columbia	1,162	34,246	2.9

Source: Statistics Canada, The Labour Force, December 1977, p. 62:
and Table 7.

TABLE 10

Vacancies for Full-time Jobs and (intended) Occupations of Immigrants,
1975-1977

Occupations	Average Annual Vacancies (Thousands)			Occupations (intended) of Immigrants (Thousands)		
	1975	1976	1977	1975	1976	1977
Managerial, Administrative & Related	3.2	2.8	2.4	5.8	5.7	4.3
Natural Sciences, Engineering & Mathematics	3.3	3.0	2.9	8.9	5.6	4.2
Architects & Engineers	1.3*	1.1	.9	2.2	1.7	1.3
Draughtsmen	.7*	.3	.3	2.0	1.0	.5
Social Sciences & Related Fields	1.0	.8	.7	1.1	.9	.7
Teaching and Related	.7	.6	.6	2.6	2.4	1.8
Medicine and Health	3.6	2.1	1.5	5.6	3.8	2.5
Nursing, Therapy & Related	3.2*	1.6	1.0	3.6	2.4	1.4
Clerical and Related	9.7	8.3	6.7	11.8	9.3	7.1
Book-Keeping, Account-recording	2.3*	1.6	1.3	2.6	1.9	1.3
Sales	4.1	4.3	3.3	3.3	2.6	2.2
Service (excluding Domestic Service)	7.5	5.1	4.8	7.1	5.6	4.6
Protective Service	1.4*	.7	.5	.4	.3	.3
Food & Beverage preparation and Related	3.9*	2.2	2.3	3.0	2.3	1.7
Personal Service	1.1*	.7	.6	2.3	2.1	2.0
Machining and Related	2.7	2.0	2.2	5.2	3.0	2.2
Product Fabricating, Assembling and Repair	8.5	7.1	5.5	11.9	8.4	6.2
Mechanics and Repairmen	3.7*	2.9	2.3	4.6	3.1	2.4
Construction Trade	4.1	3.4	2.8	5.9	4.0	3.1
Electric Power, Lighting and Wire Communications Equipment Erecting, Installing and Repairing	.7*	.5	.4	1.0	.7	.5
Transport Equipment Operating	1.9	1.4	1.0	1.1	.8	.5
Carpenters and Related	.7*	.5	.3	1.2	.8	.6

* Averages of the first three quarters only.

Sources: Vacancies - Statistics Canada, Annual Report on Job Vacancies, 1977 (Cat. No. 71-203, Annual);

Occupations of Immigrants - Department of Manpower and Immigration, Immigration Statistics (Annual).

APPENDIX A

THE UNIVERSITY OF CALGARY
Department of Economics
2920-24 Ave. N.W.
Calgary, Alberta
T2N 1N4
(403) 284-5857

The Personnel Manager,
Widget International Co. Ltd.
Toronto, Ontario

June 21st, 1979

Dear Sir:

I am engaged in a study of the manpower programmes and policies of Canadian industry, the completion of which requires your assistance. It is my hope that you will find it possible to respond to the few questions set out below. Would you please allocate five minutes of your time? I would much appreciate it.

The questions relate to manpower policies and programmes over the recent past. To the extent that current policies differ, and if you wish to comment on the difference, please do so.

1. How has your company managed its requirements for qualified (professional, technical, skilled trades etc.) manpower?
 - ☐ (a) Trained its own.
 - ☐ (b) Hired in the domestic market.
 - ☐ (c) Hired from foreign countries on permanent basis.
 - ☐ (d) Hired from foreign countries on temporary work permit basis.
2. To the extent that your company trained its own workers, was it done in-house or externally?
 - ☐ In-house.
 - ☐ External to the company.
3. To the extent that training was done "in-house", please respond to the following:
 - (a) Who provided the training?
 - ☐ Supervisor(s) and other workers from within the Company.
 - ☐ Instructors from outside the company.
 - ☐ Other (please specify).
 - (b) Where was the training provided?
 - ☐ Within the company's premises.
 - ☐ Within the premises of an associated company.
 - ☐ Other (please specify).

4. To the extent that the training was done externally, please respond to the following:

(a) Who provided the training?

- ☐ Educational institutions (technical college, community college, vocational school).
- ☐ Equipment manufacturer.
- ☐ Employer's association.
- ☐ Trade union.
- ☐ Other (please specify).

(b) Who bore the cost of the training?

- ☐ Federal government (entirely ___; partially ___).
- ☐ The company (entirely ___; partially ___).
- ☐ The equipment manufacturer (entirely ___; partially ___).
- ☐ The provincial government (entirely ___; partially ___).
- ☐ The educational institution (entirely ___; partially ___).
- ☐ The employer's association (entirely ___; partially ___).
- ☐ The trade union (entirely ___; partially ___).
- ☐ The workers involved (entirely ___; partially ___).

5. Was the labour organization of your company involved in any formal way in the training process?

☐ Yes. ☐ No.

6. If answer is "Yes", please indicate in what way.

- ☐ Participated in design of programme.
- ☐ Participated in funding.
- ☐ Agreed to training after work hours.
- ☐ Other (please specify).

7. Do you anticipate significant changes in demand for skilled manpower with the advent of micro-processors and other electronic processes?

☐ Yes. ☐ No.

Please explain if you wish.

Thank you very much for your cooperation.

Yours sincerely,

Stephen G. Peitchinis
Professor of Economics.

TECHNOLOGICAL INNOVATION STUDIES PROGRAM
PROGRAMME DES ÉTUDES SUR LES INNOVATIONS TECHNIQUES

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