

Human Adjustment to Technological Change : An Economist's View

L'aspect économique de l'adaptation au changement technologique

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Résumé de l'article

L'adaptation aux changements technologiques n'est pas un sujet nouveau. La hausse du chômage de 1957-60 et le développement technologique ont amené ce débat, il y a déjà dix ans. Les économistes ont discuté le rôle relatif des facteurs structurels et de l'insuffisance de la demande agrégative comme cause majeure de ce chômage. Les keynésiens ont prôné des politiques fiscales et monétaires, les structuralistes ont avancé des politiques de main-d'œuvre comme solutions à ce problème, tandis que d'autres remettent en question la situation en suggérant l'approche de la société des loisirs.

Nous n'avons pas l'intention de régler ces vastes questions ici. Nous faisons l'hypothèse que l'emploi rémunéré va continuer à jouer un rôle important dans notre société et que les changements technologiques et autres vont continuer à causer des déplacements de main-d'œuvre. Le but de cet article est double : d'abord, examiner comment la négociation collective a traité ce problème de déplacement ; ensuite, voir quel genre de tendance les changements mentionnés peuvent inculquer aux relations du travail et à la négociation collective.

Nous examinons d'abord l'aspect coût-bénéfice des changements technologiques. Nous concluons que la théorie économique de la firme nous porte à croire que, dans la majorité des cas, le côté patronal a tout le temps disponible de planifier en fonction des changements causant de sérieux déplacements. Il est à noter que les entreprises qui font des changements ne sont pas toujours celles qui ont les plus grandes marges de profit. Quand l'entrée dans le marché est facile et la concurrence étrangère sérieuse, la firme qui introduit d'importants changements fait face à de sérieux désavantages vis-à-vis ses concurrents.

Ensuite, vient une analyse de conventions collectives basée sur des inventaires des gouvernements fédéral et ontarien. Il s'agit de vérifier neuf hypothèses afin de voir, entre autres choses, l'influence des différents contextes sur le contenu de la négociation collective et la direction qu'elle prend. L'analyse de cas spécifiques met en évidence quelques-unes des raisons principales pour les faillites et les succès de la négociation collective face aux changements technologiques

La discussion continue par une analyse des principales solutions canadiennes au problème des déplacements de main-d'œuvre et un résumé des principales conclusions :

- a) l'évaluation du taux de changement technologique aux niveaux macro et micro est difficile ;
- b) il est presque impossible de distinguer entre l'impact des changements technologiques sur l'emploi et les autres causes de déplacement de main-d'œuvre ;
- c) il y a une grande période d'attente entre l'innovation et l'implantation des nouvelles technologies ;
- d) les changements technologiques n'impliquent pas nécessairement des déplacements de main-d'œuvre ;
- e) il y a plusieurs causes à ces déplacements autres que les changements technologiques ;
- f) les entreprises qui introduisent les changements technologiques ne sont pas toujours celles qui ont les plus grandes marges de profit ;
- g) les plus anciennes firmes dans un marché subissent la double pression des innovations technologiques et de l'assistance aux déplacements de travailleurs ;
- h) les travailleurs non-qualifiés sont les plus affectés par les changements d'emploi et plus résistants face aux déplacements géographiques ;
- i) l'absence de cadre théorique pour étudier l'impact de la négociation collective sur les taux de déplacement empêche toute comparaison et l'intégration des différentes études. Cet article n'est qu'un premier pas dans ce sens. Il semble y avoir une corrélation positive entre certains genres de clauses dans les conventions collectives et certaines variables contextuelles ;
- j) les déplacements de main-d'œuvre qui n'impliquent pas de mobilité géographique sont les plus faciles à solutionner par la négociation collective ;
- k) les travailleurs ne se servent pas des primes à la mobilité. Ceci implique l'impuissance de la négociation collective lorsqu'il y a un déplacement de main-d'œuvre dans une région à basse opportunité d'emploi ;
- l) les travailleurs vont accepter le recyclage seulement si un emploi leur est assuré ;
- m) l'existence d'unités d'ancienneté limite les possibilités d'adaptation surtout dans les cas de pluralisme syndical ;
- n) on devrait faire un plus grand usage des Centres de main-d'œuvre et des contacts que les syndicats et la compagnie ont avec le marché du travail pour faciliter l'adaptation des travailleurs ;
- o) les fonds de déplacement n'ont pas eu d'impact à date ;
- p) l'usure de la main-d'œuvre n'est pas un remède aux déplacements.

Le rapport Freedman et le Conseil économique du Canada ont également étudié ce problème. L'un contient, entre autres, quelques recommandations radicales, alors que le travail du second est très décevant.

Human Adjustment to Technological Change: An Economist's View

Arthur A. Kruger

The focus of this paper is to examine how collective bargaining has attempted to cope with the problems of worker displacement and how these developments might indicate future trends in union-management relations as well as the limitations of collective bargaining.

Introduction

Over the past decade¹, there has been considerable discussion of the problems of adapting workers to change. The debate was sparked by the rise in unemployment levels in Canada and the United States in the period 1957-1961 and the accompanying spread of new technology symbolized by the computer. Economists began to discuss the issue of structural unemployment — a special type of unemployment resulting from rapid shifts in technology and consumer demand². The proponents of the structuralist position pressed for

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The author is indebted to Mr. E. Lightman, a graduate student at the University of California (Berkeley, California), who provided invaluable assistance in this study. Mr. Lightman did most of the work in assembling the materials for the case studies in which some of the findings of this study are based.

² For an excellent discussion of this subject see WINDER, J.W.L., « Structural Unemployment » in A. Kruger and N.M. Meltz (ed.), *The Canadian Labour Market: Readings in Manpower Economics*, Toronto: University of Toronto, Centre for Industrial Relations, 1968.

the development of manpower programmes to speed the adjustment of labour supply to these demand changes. Others urged a more radical rethinking of the relative roles of work and leisure. They wanted programmes designed to prepare men not for new jobs but for a future in which work would be insignificant and output would be procured largely by machines³.

Much of this debate centered on the question of whether or not technological change was proceeding at a rate so different from the past that it posed entirely new adjustment problems which required vastly different institutions and attitudes from those developed heretofore.

This debate, as well as the experience of change and worker displacement in many industries, influenced the thinking of corporate and union officials as well as governments. In collective bargaining the emphasis shifted somewhat to matters such as work rules, seniority rules, the age of retirement, the level of pension benefits, severance pay and supplementary unemployment benefits. All of these mechanisms were commonly found in existing collective agreements. Unions sought to use these readily available devices to facilitate the adaptation of workers to displacement. Managements were reluctant to give way because they feared that such programmes committed companies to unpredictable costs and also because they often inhibited the firms in applying new technology.

In some cases, union leaders and management worked out bold new programmes designed to facilitate worker adjustment to technological change without unduly inhibiting the corporation's ability to implement change. The most interesting and important cases on this continent are described in Appendices II, III, and IV of my Report to the Task Force on Labour Relations⁴.

Governments also responded by re-thinking the role of vocational training in education, and by expanding programmes for adult retraining. Research was undertaken on forecasting manpower requirements. Other new areas of state activity opened up including manpower mobility assistance and subsidies to encourage industrial expansion in depressed areas.

In this paper I want to draw together some of the diverse information which bears on the problem of adjusting to technological change through

³ See « The Triple Revolution », *Advertising Age*, April 6, 1964 or PIEL, G., *Consumers of Abundance*, Centre for the Study of Democratic Institutions, 1961.

⁴ KRUGER, Arthur, *Human Adjustment to Industrial Conversion*, Project No 45, Task Force on Labour Relations, Ottawa, 1968.

collective bargaining. I will discuss first some of the insights which economic theory can provide in evaluating the attempts to adjust to technological change at the level of the firm or industry. In section II below I will present an analysis of the costs and benefits of change and of programmes designed to adapt to change as they are viewed by workers, union leaders, management and governments. Section III reviews some noteworthy experiments (mostly through collective bargaining) in coping with worker adaptation to change. In section IV, I will examine some proposals originating in Canada for handling displacement. The final section provides a summary of the findings.

I will not discuss the issue of the pace of current and future technological change relative to that in the past. Nor will I enter the debate on the future relevance of work. Rather I will assume that change is proceeding at a pace which does create problems of adjustment for many workers and that paid employment will continue to be important to most of the adult population in the foreseeable future.

Technological Change — Costs and Benefits

Each party, confronted with the prospect of change, will attempt to assess the likely costs and benefits of the innovation. On the basis of this appraisal, the parties will determine the attitudes toward the change and toward the pace of adoption of change. In this section I will examine the costs and benefits of technological change as viewed by each of the parties. With this we can see the limits of management's willingness to make concessions in order to receive worker and union approval for change as well as the factors influencing worker and union attitude to change. The factors determining the economic costs and benefits for society also will be examined.

THE SOURCE AND MEASUREMENT OF TECHNOLOGICAL CHANGE

Macro-Economic Measure of Change

Although our focus is on the subject of technological change at the micro-economic (firm or industry) level, we might begin by noting a few factors concerning technological change at the macro (economy-wide) level. The traditional measure of technological change at the macro-economic level is change in output per unit of labour input. Output is most commonly expressed in terms of the dollar value of total production and labour input is measured by the number of man-hours expended in producing this output.

There are numerous problems associated with this measure. These have been discussed extensively elsewhere and we need not do more than enumerate some of the more critical problems here. First, of course, the focus on the labour input should not imply that changes in the effort or quality of labour are the sole or even the most significant sources of rising output. Changes in the quality and quantity of other factors of production (capital, raw materials and land) are also relevant. Recognition of this fact has resulted in the increased use of measures which treat explicitly the inputs of *all* the relevant factors. Furthermore, our measure of change will be influenced by such variables as the distribution of output among sectors as well as by changes in the quality of inputs or in the method of combining inputs. The reader interested in pursuing this matter further can turn to one of the numerous recent studies on this subject⁵.

Micro-Economic Measure of Change

Our major concern is with change at the plant, firm or industry since it is at this level that the parties to collective bargaining attempt to cope with change. Here change is usually measured by the extent to which production costs per unit of output are altered. However, it is useful to distinguish between alternative sources of unit cost changes. First, costs may be altered because prices of some or all of the inputs used by this firm or industry have changed. This change is highly significant to the firm or industry but it is not deemed to be a *technological* change in the affected firm or industry. Rather it reflects changes elsewhere, namely in the industries supplying these inputs. The input prices may have been altered by technological change in the input supplying sectors or by other market forces (e.g. the degree of competition, shifting opportunity costs, changing demand) in these and related markets.

Then, a firm (or industry) may alter the scale of output in response to either changing input prices or changes in demand for its product (or both). The new output level chosen may involve a change in unit costs of production and may also result in some alteration in the mix of factor

⁵ See KENDRICK, J.W., *Productivity Trends in the United States*, Princeton : Princeton University Press, 1961 ; DENISON, E.F., *The Sources of Economic Growth in the United States and the Alternatives Before Us*, New York : Committee on Economic Development, Supplementary Paper No. 13, 1962 ; KOTOWITZ, Y., « Technological Progress and Labour Displacement » in A. Kruger and N.M. Meltz, *The Canadian Labour Market*, Toronto : Centre for Industrial Relations, University of Toronto, 1968 ; KOTOWITZ, Y., « Production Functions in Canadian Manufacturing 1926-39 and 1947-61 » (Unpublished mimeo.).

inputs. This is often viewed as a case of technological change when it results in an alteration in the mix of factor inputs. However, it is caused by a shift in output level which involves a change in *the choice of known technologies* rather than by the discovery and implementation of a new technology.

The final source of cost change is the result of the discovery and application of new technology (new methods of combining inputs, or new inputs) which cuts production costs for the desired output level. This is often deemed to be the only meaningful use of the term technological change as it applies to firm or industry supply.

There is not much point in entering into the debate on whether all of these changes or only the last kind should be classified as technological change. The fact is that usually two or all three of these changes occur simultaneously and often one such change triggers off changes of another type. (For example, higher input prices may alter the desired scale of output, or application of new techniques may alter input prices.) Although it is useful to distinguish among these three sources of cost change, in practice the available measures encompass their combined impact and there is no ready way of disentangling them.

So far we have focused on the input side of our measure of technological change — input cost per unit of output. Another significant change may be a shift to new kinds of outputs by the firm. This may be the result of the discovery of a new product or new uses for a known product which raise demand for it. It may also reflect the discovery of new ways of producing a product which lower costs and make production of this product more attractive than heretofore. These events would also be covered by the term technological change. However, the production of the new product may reflect changing consumer tastes, or changing prices in other product markets or shifts in input prices which at best are only indirectly the result of technological changes, or which may have nothing to do with changing technology.

TECHNOLOGICAL CHANGE AND LABOUR DISPLACEMENT

Popular discussion of the subject often assumes that technological change is inherently labour displacing. This is not necessarily true either at the macro or micro level. At the macro level the degree of unemployment created by such changes is a function of the level and composition of aggregate demand, the degree of competition and mobility in markets, as well as the pace of discovery and implementation of new methods. It is

not possible to untangle the portion of unemployment attributable to technological change or to other sources. Attempts such as the study by Horne, Gillen and Helling, *A Survey of Labour Market Conditions in Windsor, Ontario - 1964 A Case Study* (Ottawa : Economic Council of Canada) produce nothing that is meaningful. This problem is also demonstrated in the rather fruitless debate between the structuralists and the deficient demand schools of economists over the relative role of these factors in creating unemployment ⁶.

Similarly at the micro level, other factors enter. First the change may in fact be such as to *raise* the labour input required per unit of output at the expense of other inputs. Furthermore, if the change so lowers costs and prices as to significantly raise output, then total employment may rise even when the labour input *per unit* has fallen. With new products, the impact depends on whether their production uses more or less labour than the products which they may replace.

There is some evidence that on balance, technological change in Canadian manufacturing has tended to be labour displacing in the sense that the required labour input per unit of output has fallen. However, total employment has held up because of buoyant aggregate demand from a variety of sources including expanded sales as a result of lower costs and lower prices for the products.

There is no inherent reason to expect technological change either to create or to destroy jobs in the aggregate. The impact of such change at the aggregate level depends on a variety of other factors primarily the government's monetary and fiscal policies. What is certain is that technological change will create adjustment problems both for labour and for management. Such changes will require workers to change their occupations, plants, firms, industries or geographic locations. However technological change is not the only source of such dislocation. Such forces as the discovery of new sources of raw materials or changes in the level of aggregate demand or the composition of aggregate demand will have similar displacement effects. It is worker displacement rather than technological change *per se* that generates problems for workers, management, governments and collective bargaining. (More will be said on this subjects in section C which follows.) We should bear in mind that much of the debate about automation and many of the collective bargaining

⁶ For a good summary of this debate see WINDER, J., «Structural Unemployment» in Kruger and Meltz (ed.), *The Canadian Labour Market*, Toronto : Centre for Industrial Relations, 1968.

experiments designed to cope with technological change reflect the concern over the broader problem of adjusting displaced workers whatever the source of displacement.

MANAGEMENT AND TECHNOLOGICAL CHANGE

Most economists assume that the prime motive influencing the behaviour of corporate management in the marketplace is the desire to increase profits. The decision on whether or not to make changes in the firm and the timing of change will reflect this desire. Obviously no innovation will be adopted unless it is expected to raise profits either through lowering production costs or improving product quality so as to permit the firm to increase sales or raise the product price.

Popular discussion of the problem of technological change focuses on the discovery of new types of capital equipment which usually are assumed to be rapidly adopted and labour displacing. But the problems of technological change do not always emerge so suddenly and so dramatically. Usually there is a long time lag between the discovery of a new process and the application of the process.

There are several reasons for the delay. First there is the problem of communication. Many new processes remain unknown to some potential users for prolonged periods of time. (A good example is the oxygen furnace now widely used in steelmaking but unknown on this continent for many years after its application in Europe.)

Even when a new process becomes widely known, it is not usually applied immediately. Firms will continue to use existing processes which appear to be more expensive as long as the « variable costs » (operating costs) of the old process are less than the total costs of the new process. Only when existing equipment requires expensive overhaul or replacement will the firms adopt the new techniques in preference to the old. New entrants to the industry would of course adopt the best techniques and may be in a better profit position than established firms saddled with high fixed costs associated with existing plant and equipment.

Not all technological change involves the application of recently discovered technology. Often the technological change involves the application of techniques that have been known for some time. The firm may choose to apply them because of other changes that may have occurred to make it more desirable than in the past to employ the new techniques. For example, the firm may wish to market a *new* product for which a long established, but never used, technique is best. The firm may wish to change the scale on which it operates, as a result of changes in product demand

or in factor costs. The new level of output may require a change in technique for the firm to maximize profits. Finally, the relative prices of the factors of production might change and this could induce a change in technique that shifts the mix of factors in favour of those whose relative price has fallen.

All of this points to several crucial facts which influence the problem of worker adjustment :

- 1) Firms making technological change expect to derive financial benefits from the change. However, these firms may or may not be in a favourable profit position.
- 2) Where entry is possible, the firm may be following what new entrants to the industry have already done. In some cases the firm making the change may be in a less favourable financial position than the newly established firms that use the lower cost equipment from the outset and are not faced with fixed charges associated with the earlier decisions to operate with other techniques. New firms are seldom asked by unions or governments to compensate workers because new techniques are employed. Yet older and *perhaps* less profitable firms are expected to assist workers affected by change.
- 3) Firms seldom face a sudden decision on technological change. Usually the alternative technology is known to the employer and has been studied long before change is actually implemented. Only when market conditions change sharply or when the new technology permits a *drastic* cut in costs will the firm be forced to make a rapid decision to adopt new technology. Normally, firms do have considerable time to engage in consultation with unions, workers and governments, prior to implementing a major technological change. The experience at Bowaters Mersey Paper Co. discussed in G.K. Cowan's study provides an illustration of the opportunities afforded for such discussions ⁷.
- 4) Technological change in a given industry is not the sole nor even necessarily the most important source of worker displacement in that industry. Workers may also be displaced because of :
 - a. shifts in product demand resulting from changes in income, tastes, relative product prices or scope of markets.
 - b. shifts in the level of product output resulting from changes in costs of production which may occur as a result of technological

⁷ See COWAN, G.K., *Proposed Measures to Facilitate Manpower Adjustment to Technological and Other Change*, Ottawa : Economic Council of Canada, 1966.

change, but which also take place as a result of changes in factor markets.

- c. shifts in *relative* factor prices resulting in changes in factor proportions.

In these cases, technological change in other sectors (rival or complementary products or in factor markets) may be responsible for the worker displacement in a given industry. Other forces such as the pace of economic growth, tariffs and trade agreements, changes in the nature of competitive conditions in various markets (including the labour market) and a variety of government activities may also initiate the pressure which ultimately generates worker displacement in a given sector. Here the firm or industry may be faced with unexpected pressures for rapid change. Displacement cannot be planned in advance and may be as extensive in its impact as the more widely discussed instances of worker displacement by new machines. In our concern with the direct impact of the introduction of new technology in a given firm we may lose sight of the important and possible more difficult problems of worker dislocation resulting from these other causes. While the focus of this paper is on dislocation due to technological change, much of what is said is applicable to the more general problems of worker dislocation regardless of the source.

THE WORKER AND TECHNOLOGICAL CHANGE

Normally workers have little incentive or opportunity for initiating technological change. (There are exceptions to this, notably the Scanlon Plan or other similar plans.) Rather they are confronted with the prospect of change and react to management's decision in this area.

For workers, such change is usually viewed with fear and suspicion. They see few benefits arising from technological change. Even where they are persuaded that change is the source of economic growth and benefits everyone in the long run, they feel often with justification, that changes in their own particular firm or industry bring nothing but dislocation and problems for them. If this view appears to be short sighted, it is nonetheless understandable. Long run general benefits are not as tangible and important as immediate losses both monetary or psychic. (Lord Keynes once noted that in the long run we are all dead.)

There are cases of course where technological change results in upgrading of workers in pay and in the nature of work but workers seldom anticipate such favourable impact from change.

Workers focus on the costs rather than the benefits of change. The costs include not only such monetary costs as loss of income resulting from unemployment or a downgrading in occupation. They also include the psychic discomforts incurred in adjusting to a new occupation, new co-workers, a new employer, a different community and so on.

The level of adjustment required is a function not only of the immediate impact of the change on a given worker's job, but on how the change influences his employer's competitive position and his employer's ability to provide him with continued employment. Where a change of employer or occupation is involved, the impact on the worker depends on how prepared he is to move to a new occupation, employer or community and on the extent to which his potential employment differs from his previous position. These in turn depend on a number of characteristics of the workers involved (prior education, training or experience, age, sex, marital status, community attachment, home ownership, accumulated savings, etc.) and on the state of the labour market both in his locality and elsewhere (with such factors as the level and composition of employment and unemployment in his firm, trade, locality and nation as the relevant factors).

In summary, workers seldom see benefits arising from change and focus on costs (both monetary and psychic) associated with adjustment to change. Given this perspective, it is understandable that the normal worker response to the prospect of change is fear and hostility.

Union policies reflect worker concern over displacement. This in part reflects the democratic structure of many unions and also the desire of union leaders to ensure union survival and power. Where technological or other changes appear to threaten the employment of union members or to enhance management's power to resist union bargaining pressures, unions will oppose change. Where no such threat is in prospect but workers must adjust to change, unions will accept change but attempt to influence the pace of change or to secure arrangements which facilitate worker adaptation⁸.

⁸ An example of this difference in union attitude is the difference in the reaction of the railway firemen and the boiler makers to the introduction of the diesel engine. The change meant the destruction of their skill and union for the firemen whereas the boiler makers had alternative jobs to go to where their skill was utilized and where they often remained within their union. The firemen fought the innovation longer and harder than did the boiler makers. I am indebted to Professor John Dunlop of Harvard University for this example.

The objectives of union members and their leaders normally are in harmony and this permits agreement on strategy toward change. However in some cases, the institutional objectives of union leaders and the goals of some or all of the membership may conflict. Union leaders may sacrifice potential benefits for displaced workers (who will leave the union) in the interest of greater benefits for those who remain employed or enhanced bargaining power for the union. (John L. Lewis' policy in the coal industry provides an example of this.) Union leaders may be prepared to see their members hurt in cases where union power or survival is threatened. In such situations, they may risk the prospect of loss of employment for many members for the prospect, however slight, of holding power. Through their ability to present selectively the issues to the rank and file, they often get membership support for such risky ventures. (The ITU strike at the Toronto newspapers provides a vivid example of this.)

In some cases, union leaders are compelled to choose between the interests of conflicting groups within the union. Should older workers' jobs be protected by seniority at the expense of younger workers? Should older workers be compelled to retire to permit the younger workers to hold their jobs? Should a curb be placed on overtime work (or other work sharing arrangements be imposed) to spread work over a larger group of members or should a smaller group get the opportunity to enjoy larger incomes?

In assessing union reaction to displacement, we must recognize the multiplicity of pressures on union leaders. Some of these emanate from the rank and file and reflect worker assessments of costs and benefits. Various groups of members may hold conflicting views and each group will attempt to impose its own position on the union. Others reflect the institutional requirements of the union itself and the desire of union leaders to retain positions of power and influence which require the preservation of the union and the enhancement of union strength.

THE GOVERNMENT INTEREST IN CHANGE⁹

Certain areas of government concern with change are well known. Modern governments are committed to policies promoting economic growth. Technological change is a crucial variable determining the growth rate.

⁹ For further discussion of the basis for government concern and for an evaluation of public policy in this area see KRUGER, A. and N.M. MELTZ, *The Canadian Labour Market*, Toronto : Centre for Industrial Relations, 1968, particularly the articles by Kruger, Winder and Drummond. For further discussions of public policy goals see ECONOMIC COUNCIL OF CANADA, *Fourth Annual Review*, Ottawa : Queen's Printer, 1967, page 2.

Unemployment is also a matter of public concern. Governments have accepted the objective of reducing unemployment to an « acceptable level » and of assisting those temporarily unemployed. The state, therefore, is concerned lest change result in an undue amount of unemployment. As part of the growth and stabilization goals, the governments seek to check inflationary pressures and preserve the exchange value of our dollar. Cost cutting, technological and other changes contribute to these goals. Keynesian policies designed to raise aggregate demand are the primary device for checking unemployment, or inflation.

There has been some concern over whether these policies can work effectively when unemployment and inflation occur simultaneously to a degree that is deemed unacceptable¹⁰. There is also the matter of the impact of Keynesian policies on the long run growth rate. Economists are not in agreement on this question. Governments appear to accept and utilize the Keynesian tools albeit with some reluctance and skepticism. They seek to supplement them with other devices including manpower programmes. These are designed to assist workers in adapting to displacement and hopefully also to curb inflation and promote growth.

It is relatively easy to measure the cost of public information, training, mobility and locational incentive programmes which form the core of public policy in this area. It is more difficult to measure the social benefits of these policies. This involves such matters as value judgments on the weight to be placed on the suffering of the unemployed, the benefits of maintaining community ties, and so on. There are also serious measurement problems (even after these value judgments are made) in determining the impact of these policies in such areas as relative and absolute prices including factor prices such as wage rates and salaries.

SUMMARY OF COSTS AND BENEFITS OF TECHNOLOGICAL CHANGE

In discussing the desirability of technological change and the undesirable features of such change, we must recognize at the outset that the assessment of costs and benefits varies greatly within society.

To management, such changes are essential for the health and even survival of their firms. Technological change reduces costs and is seen as desirable. The pace of change depends on a comparison of operating costs (ignoring fixed costs) using existing techniques against total costs with

¹⁰ See WINDER, J.W.L., « Structural Unemployment » in A. Kruger and N.M. Meltz (ed.), *The Canadian Labour Market: Readings in Manpower Economics*, Toronto: Centre for Industrial Relations, University of Toronto, 1968.

the proposed innovation. Firms usually know well in advance that a major change will occur. Although technological change tends to enhance profits, firms making the change are not necessarily highly profitable and often are hard pressed by new entrants (or foreign competitors) who have adopted the improved techniques unencumbered either by fixed costs or pressure to compensate displaced workers.

Workers normally react negatively to technological change. They know from experience that change disrupts the social system at the work place, threatens jobs and skills, and can undermine or destroy their union. They seldom anticipate benefits from such changes. Union leaders will oppose any change that threatens the survival of the union. Other changes normally are accepted by the union in principle, but through collective bargaining attempts are made to mitigate the impact on the displaced union members. The union in some cases may assist management in securing worker acceptance of change.

Governments are ambivalent toward major technological changes. They desire such changes because of the favourable impact of the rate of economic growth, price stability and the foreign trade balance. However, they face strong pressures to assist workers and communities wherever the change involves significant dislocation. Change brings long term social benefits but dislocation involves immediate pressures on the public treasury. In general, governments encourage technological change and use a mix of Keynesian and other policies (e.g. industrial location and manpower programmes) to alleviate the impact on those bearing the heaviest cost of change. These programmes have an impact beyond the assistance to the dislocated and their side effects are often dysfunctional.

Collective Bargaining and Technological Change

In this part of the study I want to deal with the empirical evidence on attempts to cope with worker displacement through collective bargaining. Those interested in Canadian cases involving attempts to adapt to worker displacement through collective bargaining should consult the following studies :

F. QUINET, *The Collective Agreement in Canada : The Study of its Contents and of its Role in a Changing Industrial Environment*, especially pages 33-116. (Ottawa, Department of Labour, Economics and Research Branch, 1967).

Canada, Department of Labour, Economics and Research Branch, *Response to Technological Change : A Study of Technological*

Change Provisions Contained in Major Collective Agreements Effective in Canadian Industries, a study by David Ross. (Ottawa, Department of Labour, Economics and Research Branch, 1967).

Ontario Department of Labour, *Technological Change in Ontario Collective Agreements: Ten Manufacturing Industries*, by D. PLAUTZ. (Toronto: Research Branch, Ontario Department of Labour, 1967).

G.K. COWAN, *Proposed Measures to Facilitate Manpower Adjustment to Technological and Other Changes: Twelve Selected Case Studies*. (Ottawa, Economic Council of Canada).

All of these studies provide valuable information on attempts to cope with technological change through collective bargaining. It is unfortunate that coordination was not possible in designing these various studies (including my own). Only the Cowan study employs a methodology which identifies firms and thus permits integration with my own findings. The other studies, (sponsored by the Canadian Department of Labour and the Ontario Department of Labour) provide a great deal of relevant material on the extent and nature of collective bargaining provisions designed to cope with technological change. However, they do not identify the firms involved and therefore cannot be directly integrated with the material collected for this paper. They do provide a very valuable picture of Canadian experience and I will begin by summarizing some of their critical findings.

THE SURVEYS OF COLLECTIVE AGREEMENTS IN CANADA

The Ross Study:

For some years now the Canada Department of Labour has compiled statistics on the content of collective agreements in Canada. These studies, under the direction of Mr. Felix Quinet, use the extensive file of collective agreements in the Department to show the extent to which various provisions (e.g. pensions, seniority, etc.) are found in these contracts.

In recent years particular emphasis has been placed on those clauses which are designed to cope with technological change, or which can be applied to this problem. Four of the eight papers by Felix Quinet, in the volume referred to above, are devoted to this problem. The study by D. Ross, under the direction of Mr. Quinet, is the latest in this group of studies and it is the findings of the Ross Study that I want to summarize first.

Ross used a survey of agreements covering 471 companies, each employing 500 or more workers. (He excluded construction companies and the railways). The contracts were in force in 1966. Ross includes only those contractual clauses which state explicitly that they are designed to cope with problems of worker displacement and excludes clauses which might serve this purpose but are not so designated. The relevant clauses are then grouped under the following headings :

advance notice ; income maintenance (e.g. severance pay, S.U.B., etc.) ; worker adaptation (e.g. retraining, mobility, grants, etc.) ; employment sharing (e.g. shorter work week, early retirement, etc.) ; joint union management procedures (e.g. study committees).

His most important findings are summarized in the following quotation :

« Of the 471 agreements, 28% contained explicit technological change clauses. The largest number of these clauses were income maintenance provisions, largely severance pay. However, 16 agreements provided complete income security for the workers extending for an indefinite period of time. Only five agreements contained employment-sharing provisions. Of interest also is the fact that although only 133 collective agreements were found to contain technological change provisions, 277 separate provisions were surveyed. This seems to indicate that in many a technological change context, a combination of provisions is often called for in dealing with the problems generated by new technology. »
(*Response to Technological Change*, pp. 3-4)

The tables from the Appendix to Professor Ross' study summarize the findings on the degree to which different kinds of provisions occur. Income maintenance provisions are the most common kind of arrangements, employment-sharing the least used, and the other three kinds of provisions about equally prevalent. Where advanced notice is found, it is usually accompanied by a severance pay provision. Retraining provisions are much more prevalent than relocation as an adaptation device. The few employment-sharing contracts appear to use the reduced work week rather than early retirement. Union-management procedures tend to rely on consultation rather than negotiation or arbitration.

The Plautz Study :

The Ontario survey conducted by Mr. Dieter Plautz under the direction of Mr. John Kinley, is limited to the plants of ten manufacturing industries located in Ontario. This study follows the Ross approach in including only those contractual clauses that explicitly indicate that they are designed to facilitate the adjustment of workers displaced by techno-

logical change (defined here broadly enough to include most forms of displacement and not merely technological change in the more usual sense of this term).

The survey included 1,078 agreements in 1,023 establishments covering 218,000 production and related workers in these ten industries. They were the most recent contracts on file at the Ontario Department of Labour on March 31, 1967. The clauses were grouped somewhat differently from the categories employed by the Ross study. The Ontario study used the following classification system :

advanced notice and consultation ; changes in job content and rates of pay (e.g. job classification, rate and manning requirements) ; job security (e.g. attrition, shorter hours, seniority, relocation, retraining, etc.) ; cushioning the impact of job change and job loss (e.g. severance pay, retraining, relocation, etc.) ; sharing the gains of productivity.

Plautz found that 334 agreements (31%) covering 149,000 workers (68%) had clauses specifically designed to cope with problems arising as a result of change. This indicates that provisions of this kind are more likely to be found in larger than in smaller plants.

They are more common in some sectors than in others. Rubber, transportation equipment and primary metals show the greatest propensity to use them. Chemicals, meat products and machinery are at the other extreme. Paper, printing and metal fabricating occupy an intermediate position. Within sectors, larger firms are more likely than smaller ones to have such provisions.

The findings of the Ontario study with respect to the frequency of the various categories of clauses are summarized in the tables on pages 65-71 of the Plautz study. Of particular interest for our purposes are the last two tables where the frequency of various kind of clauses is classified by industry and size of the bargaining unit respectively. This permits some, albeit limited, comparison with the findings of Cowan and our own survey to be discussed below.

If we compare the Ross and Plautz findings, we see that the two studies show similar results on the matter of the frequency with which one, two, three or more contractual provisions are found. However, the important differences in the method of classification used indicates that this result is not very meaningful. On other matters the results are not consistent. The Ross study indicates that income maintenance occurs in

about 40% of the contracts. In the Ontario study « cushioning » provisions which if anything, is even broader than Ross' income maintenance occurs in only 30% of the agreements. This may be explained by Plautz's exclusion of severance pay under S.U.B. agreements. Differences in other categories cannot readily be reconciled because of differences in the grouping of clauses in these two studies.

The two studies agree on the frequency of advanced notice and joint procedures. In contrast to Ross, Plautz finds attrition more common than shorter hours. Both agree that these sorts of arrangements are not too common. They are not too far apart in their findings on retraining and relocation provisions.

It is most unfortunate that the two studies did not employ common methods of classification which would permit further comparison. It is also unfortunate that the federal study does not disclose information classified by industry or by size of firm as does the Ontario study. Neither study provides the necessary data on such other variables as competitive conditions in the relevant labour markets or economic conditions when the agreements were signed which could be useful in establishing the conditions conducive to various sorts of contractual arrangements. Finally, in my opinion, both suffer as a result of the decision to count only contractual provisions which state explicitly that they are linked to the problem of worker displacement. Often the parties will utilize long standing provisions to cope with displacement problems. Even where such provisions are negotiated in response to technological change, the contract will not necessarily state this. This is supported by Quinet who has said :

« It would indeed appear that technological change can, in fact, lead to the formulation of numerous agreement provisions that will not necessarily make an open and obvious reference to the problems from which they result. » (Quinet, *The Collective Agreement in Canada*, page 53.)

Thus these two surveys, important as they are for their broad coverage of Canadian experience, are of limited value in my own study which utilizes a different technique, closer in its approach to the Cowan, than to the Ross or Plautz papers.

THE COWAN-KRUGER « CASE STUDIES »

The agreements described in Mr. Cowan's study and in my own research were chosen because they were widely hailed as pioneering

attempts¹¹ to cope with technological change. Fortunately, there is little duplication in our choice of cases but we did gather similar data. In both studies our cases are not restricted to contract clauses that specifically mention technological change. Both studies mention the companies by name and provide data on the size of the work force. The grouping of contract clauses in categories is similar. However, Cowan's descriptions are concise but omit some facts which I included in my own cases (e.g. the date of contract changes, or the nature of labour market demand at the time of change). Some grouping of results is practical and will be attempted. Cowan limits his study to description of the twelve cases with no attempt at analysis. I will use his data along with my own findings to suggest some relationship between environment characteristics and the likelihood of certain kinds of contractual provisions. Where possible, I will draw on the results of the surveys discussed above as well.

Copies of my case studies are available in the Appendix to my Report to the Task Force on Labour Relations, Project No. 45, *Human Adjustment to Technological Change*. The Cowan studies are available on order from the Economic Council of Canada or the Queen's Printer. Readers may refer to these case descriptions for details on the experience in these companies.

Most of the studies of collective bargaining attempts to cope with technological change either are limited to description of individual cases or to surveys which gather statistics or to sweeping assertions unsupported by empirical evidence. In reviewing the literature, I could not find anyone who had formulated hypotheses concerning the variables which are relevant in determining whether collective agreements do include special provisions and if so, the nature of these provisions. Yet until such hypotheses are formulated and tested, very little can be said about how and why change influences bargaining in the way it does. Nor will we be able to predict the reaction of the parties in any given situation to future technological change without such an analysis.

After we undertook this part of the study, my research assistant and I soon learned why description or generalization has been preferred to analysis. Gathering information on cases is very time consuming. Other studies are helpful but each researcher uses his own classification system so that it is difficult and sometimes impossible to integrate the research

¹¹ Most of the work in compiling the material for the summary of cases which I use here was done by Mr. E. Lightman, a graduate student at the University of California, (Berkeley California).

of others. The choice of clauses to be included or excluded is always arbitrary. Contracts do not provide clearcut evidence of intent and many relevant changes occur outside the formal contractual provisions. An accurate designation of the nature of the environment in each case (e.g. the degree of product market competition, or the age distribution of the labour force and so on) require time consuming study in each case.

With hindsight, I feel that I was perhaps foolhardy in attempting what most others have avoided. Such an undertaking was especially hazardous given the limited resources of time, manpower and data collection facilities available to me. Yet I feel that this exercise is of value. The *method* proposed here, in my opinion, is superior to that used by other students of the subject. It is also readily applied to the data collected by the Canada Department of Labour and other government agencies and if used by them with their vast resources, could yield very worthwhile results.

Several notes of caution must be introduced at this point. First, let me repeat my earlier statement that the cases on which the analysis is based are *not* representative of prevailing practice. Nor do they include all of the instances of pioneering activity. We used those that had been widely hailed as innovating agreements.

We did our best to analyse agreements and utilize published descriptions. However, in some cases we may have missed relevant contract clauses either because they were not mentioned in the secondary source (and the agreements were not available) or because our method of classifying clauses may be faulty, although I think, very little that was relevant actually slipped by us.

More serious is the fact that it was impossible to undertake the sort of careful studies required to establish the precise nature of the relevant environment factors in each case. Thus for example, we have designated a product or labour market as competitive or non-competitive on the basis of judgements rather than market study. Judgments were also made on employment trends in the *relevant* markets at the time of the agreements. We did have more precise information on which to assess the scope of bargaining, the nature of the unions involved, and the size of the labour force. In some cases, we knew that the labour force had many older workers and this is indicated. In most cases, we could not establish the nature of this variable.

Finally, because of the small size of the sample of cases, it would be a mistake to assume that we have adequately tested our hypotheses. The data at best provide some highly tentative evidence on these hypotheses.

THE SAMPLE, THE CLASSIFICATION OF CLAUSES AND
THE ENVIRONMENTAL FACTORS

The following list of cases was used in this study :

From the Cowan Study :

Alberta Government Telephone Commission ; Bowater Mersey Paper Co. Ltd., Liverpool, N.S. ; Canada Johns-Manville Co. Ltd., Asbestos, Québec ; Canadian National Railways, London, Ontario ; Casavant Frères Limitée, Saint-Hyacinthe, Québec ; Cleyn and Tinker Ltd., Huntingdon, Québec ; Domtar Ltd. ; General Steel Wares Ltd. ; Hydro-Electric Power Commission of Ontario ; Imperial Oil Ltd. ; Moirs Ltd., Halifax, N.S. ; Pacific Press Ltd., Vancouver, B.C.

The Kruger-Lightman Cases :

Kaiser Steel (USA) ; Pacific Maritime Association (USA) ; The Basic Steel Industry (USA) ; Armour & Co. Ltd., (USA) ; American Motors (USA) ; Imperial Oil Co. Ltd., Ioca, B.C. (Canada) ; Quebec Iron & Titanium Co. Ltd., Havre St. Pierre, Que. (Canada) ; Canadian Railways – Kellock Commission (Canada) ; Domtar Ltd., (Canada) (also in Cowan list).

The Plautz Cases :

From the Ontario (D. Plautz) study, the following cases could be assessed for some variables :

Meat Products ; Rubber ; Paper and Allied Products ; Printing, Publishing and Allied Industries ; Primary Metal ; Metal Fabricating ; Machinery ; Transportation Equipment ; Petroleum & Coal Products ; Chemical & Chemical Products.

The Contractual Provisions :

The contract provisions considered relevant are classified under the following headings :

- a) Advanced Notice.
- b) Avoiding Layoff :
Natural Attrition ; Induced Attrition (early retirement) ; Retraining : company expense, shared expenses ; Relocation : with allowance, without allowance ; Transfer (seniority) ; Work Spreading (shorter hours, longer vacations, etc.).
- c) Income Maintenance :
Severance pay ; S.U.B. ; preferential hiring ; rate retention : permanent, temporary ; short week benefits.
- d) Productivity Sharing.

- e) Joint Committees :
creative ; administrative.
- f) Establishment of a Fund.
The environmental factors considered relevant were :
 - a) Competitive conditions in the product market :
competitive ; oligopoly ; monopoly.
 - b) Competitive conditions in the labour market :
company or industry dominated – oligopsony or monopsony ; many employers – competitive.
 - c) Employment trends in the labour market :
expanding employment opportunities ; contracting (or stagnant) labour demand.
 - d) Scope of bargaining unit :
one plant ; more than one plant ; one employer ; more than one employer.
 - e) Nature of union (s) :
one union ; more than one union ; craft union (s) ; industrial union (s).
 - f) Labour force age and size :
disproportionately older work force ; small bargaining unit (under 500) ; large bargaining unit (500 or over).

THE HYPOTHESES TO BE TESTED

The following hypotheses were tested against the limited data available.

- a) The greater the degree of product market power, the more likely that management will be willing to accept some responsibility for change. This is based on the argument that monopoly power is correlated with ability to pay and ability to pass on cost increases. The latter factor suggests that firms in competitive sectors are not likely to grant such concessions unless they feel that competitors will be forced to follow suit (i.e., through industry-wide bargaining or pattern bargaining).
- b) Product market power would not influence the choice of procedures used to cope with change.
- c) Company (or industry) dominated labour markets would generate stronger pressures for company acceptance of some responsibility for adjustment to change than would be true in more diversified labour markets. Such pressure should be evident in all the categories of contractual arrangements.

- d) Firms implementing change in a period of contracting job opportunities are more likely to be compelled to accept responsibility for assisting the displaced than when job opportunities are expanding. This pressure should be particularly evident in the provisions designed to avoid layoff and maintain income.
- e) Advanced notice, joint committees and adjustment funds are more likely to emerge with cases of a single plant or a single employer than with multi-plant or multi-employer bargaining units. In the latter instance, it is difficult to secure agreement within management for advanced notice and to arrange and implement the machinery for continuous consultation or funds. On the other hand relocation and retraining might be more prevalent in multi-plant or multi-firm bargaining units. Seniority is almost universally employed but obviously the more plants and firms that bargain jointly, the greater the potential scope for using seniority to ease displacement problems.
- f) Craft unions are more likely to emphasize attrition provisions than industrial unions as a device for preserving the value of their skills. The industrial unions are more likely to seek advanced notice, retraining and income maintenance programmes to assist workers in shifting to new jobs.
- g) A single union is more likely to work out arrangements for advanced notice, relocation, rate retention, productivity sharing, joint committees and funds than is possible when a company deals with many unions. Similarly seniority assumes greater significance with a single union than with multiple unions. This is because the inter-union negotiations required for these provisions makes it less likely that they can be implemented in a multi-union situation.
- h) Where the labour force is large, retraining and job transfers are more likely than they are with a smaller labour force. On the other hand, productivity sharing is more likely in small than in large bargaining units because in the former, workers can more readily see the link between such factors as technological change or worker effort and the bonus from the sharing plan.
- i) The older the work force, the more likely that reliance is placed on attrition, work spreading and funds and the less the reliance on retraining and relocation.

These hypotheses appeared to be plausible and were tested in these cases. Not all of the cases provide data on all of these environmental characteristics so that the number of cases available to test each hypothesis is not identical. Again, I wish to emphasize that the data below are *not*

adequate to provide any definitive conclusions. They do provide some *tentative evidence* concerning the validity of each hypothesis. They may also suggest some relationships to the reader that have escaped me. This approach provides a framework which could be applied to good advantage by those agencies (particularly the Canada Department of Labour) who possess information on many more cases.

THE TEST OF THE HYPOTHESES

The results of the case studies are summarized in the following three charts. Chart 1 (in Appendix) cross-classifies the firms (or industries) and the contractual clauses. In Chart 2 (in Appendix), I have indicated the nature of the environment applicable in each case. (I have used judgment in many of these designations. Anyone who wishes to disagree can readily adjust this chart and the following one.) The results of these two charts are then combined in Chart 3 (in Appendix) where the frequency or various contract provisions is plotted against the environmental characteristics.

We will turn first to an examination of Chart 1. It is obvious that the most widely used arrangements for coping with worker displacement in the Cowan and Kruger cases are advanced notice, company paid retraining, internal transfer based on seniority, attrition and joint committees. Somewhat less common but fairly popular are induced attrition, relocation at company expense and severance pay. Still less common are displacement funds, short week benefits, rate retention, S.U.B., and work spreading. Rare are the instances of shared cost retraining, relocation without allowance, preferential hiring and productivity sharing.

The Plautz (Ontario) data disclose similar results. Advanced notice is by far the most common device. It is found in all industry groups except one and most companies that have any provisions at all provide for advanced notice. Seniority and severance pay are also important. Rate retention and preferential hiring get heavier emphasis than in the Cowan-Kruger cases largely because of their inclusion in many paper and metal fabricating contracts respectively. If these cases were not included, these provisions would not be significant. Somewhat surprising is the small number of attrition cases in this sample. One suspects that attrition must be the practice in many of these cases although it does not appear in the collective agreements or is not explicitly tied to technological change.

These findings are not surprising. Seniority is a long established device for rationing employment opportunities and has become an accepted practice even in many non-union establishments. Employers have always engaged in on-the-job training, both for new workers and for

employees transferring among jobs within the firm. The use of seniority in job transfer almost invariably assumes some retraining obligation for the company. Similarly attrition is a long standing device for coping with displacement although contractual arrangements to provide for this are of more recent vintage. Advanced notice is a prerequisite for the effectiveness of many other arrangements (e.g. retraining, relocation, joint committees, etc.) and is used in most cases where any kind of displacement machinery appears. Joint committees almost invariably are established once the principle of advanced notice is accepted. Notice *per se* is of little use unless it is followed by discussion of ways of using the time available before the change to good advantage. If anything a more careful analysis of practice in these cases would almost certainly show that these procedures are even more widely followed than our data indicate.

The other kinds of arrangements are somewhat newer and have not been as widely accepted. Severance pay and preferential hiring have a somewhat longer history than most of these other arrangements. One suspects that they are often used even where no mention is made of them in the collective agreement. Benefits such as relocation grants, work spreading, S.U.B., rate retention, productivity sharing and displacement funds are newer to collective bargainings. Some (such as S.U.B., or rate retention) are resisted by management. Productivity sharing has been viewed with suspicion by many unions.

Little will be said about Chart 2. Readers should note that not only is our total sample small but that certain environmental characteristics are hardly represented at all. For example, most of our cases involve firms in oligopolistic product markets with only four competitive and two monopolistic cases. Only two of our cases involved instances of multi-employer bargaining units. Only four firms had a labour force of under five hundred. When these weaknesses are combined with the rather off-handed way in which some of the classification was done, it should be obvious that the data in Chart 3 must be interpreted with caution.

Chart 3 (with the limitations of data understood) is the most interesting of the three summary charts. It is with this data that we can test the hypotheses listed above and also perhaps come up with some alternative hypotheses suggested by the data themselves. First to a test of the hypotheses listed in section III, C (3) above. We will designate each hypothesis by the same letter of the alphabet as we used earlier.

- a) The greater the degree of product market power, the more likely that such contractual arrangements will be employed. The data are inadequate for any real test.

- b) The choice of arrangements would *not* be influenced by product market conditions. Again the data are most inadequate, but the evidence is consistent with the hypothesis.
- c) Cases of company dominated labour markets would result in more frequent use of displacement procedures. There is some support for this, particularly in the areas of advanced notice, attrition, retraining, seniority and rate retention. Strangely enough, in the matter of relocation grants where one would expect this difference to show up, the reverse holds true. This may be because the dominant employers are often single plant companies and transfer is not possible.
- d) Displacement in contracting labour markets is more likely to result in special arrangements. The data do *not* support this.
- e) Advanced notice, joint committees and joint funds are more likely to occur when only one plant or one employer is involved. There is some support for this in the area of advanced notice. Joint committees are not influenced by the number of plants but are somewhat more common in single firm than in multi-firm bargaining situations. There are too few cases of funds to say much except that the little evidence we have does not support this.
- f) Craft unions will emphasize attrition, while industrial unions will seek advanced notice, retraining and income maintenance. There is some support for the notion that craft unions will be more likely to emphasize attrition although attrition is quite common even where industrial unions are established. Advanced notice also is found in both kinds of unions but if anything is more common in the *craft* union cases. This is also true of retraining. It is true that income maintenance programmes are more likely to be found in cases where there are industrial unions.
- g) Certain kinds of arrangements are more likely when a single union bargains than when a firm (or industry) deals with more than one union. This is supported as expected by advanced notice, relocation and productivity sharing clauses. There is some flimsy support in the areas of rate retention and displacement funds as well. It is not supported in the seniority area.
- h) The size of the labour force will influence the likelihood of finding certain provisions. The data supports this but *not* in the way I expected. If anything the large firms are *less* likely to grant retraining and seniority transfer than the smaller firms. Nor is it true that productivity sharing is more likely in smaller firms.

These data for what they are worth support some of our hypotheses and negate others. They suggest that if we had a much larger sample and a more careful system of classification of the environment, we would also have to test for interaction among variables. For example, do oligopolistic firms also tend to be employers of large numbers of workers and firms with more than one plant? This interaction of variables may be the source of some distortion in our data. Also such an approach would permit the reformulation of our hypotheses in terms of several variables. The limitations of our data did not justify the attempt at this more sophisticated kind of approach.

OTHER RESULTS OF THE CASE STUDIES

The summary in Charts 1, 2 and 3 above of necessity omits a number of important facts which are disclosed in a careful reading of the cases. Among the more significant facts are the following :

- a) Union-management cooperation is most effective in cases where displacement involves a reorganization of the labour force but does not require workers to leave their firms or communities. The parties can use attrition, transfer through seniority and on-the-job retraining to cope with this kind of situation. Managements have accepted these programmes and workers also find them acceptable.
- b) Even in this most favourable kind of situation described in a) above, some serious problems may arise. Perhaps the most crucial obstacle to success is the existence of narrowly defined seniority units. Often even in cases of a single industrial union, seniority is laid out by plant or by department. In a multi-union situation, seniority units normally do not extend across union boundaries. The problem is compounded in the case of craft unions where, on top of narrow seniority boundaries one encounters apprenticeship rules, jealously guarded jurisdictional boundaries, high union initiation fees and so on. Yet successful adjustment to displacement requires as much flexibility as possible in the deployment of the labour force.

This problem is not insoluble. Some unions have shown that they can and will alter seniority boundaries in the face of the threat of displacement. In the cases of Ontario Hydro, Domtar and Moirs Ltd., we have evidence of the possibility of inter-union agreement to accept the transfer of work and workers across union boundaries so that older workers receive as much protection as possible in the event of displacement. The Ontario Hydro experience described by

Cowan is particularly instructive as to what can be achieved. Unfortunately these cases are far from typical. There are many other instances (newspaper publishing, railways, airlines, construction) where such cooperation has not been forthcoming and has frustrated attempts to resolve problems.

Unions themselves must reconsider the questions of union structure, union jurisdiction, seniority boundaries and inter-union cooperation *in advance* of crises. Frankly, I am skeptical about their ability to submerge long standing rivalry and short run power advantage to the long run interests of their members in this matter.

Other difficult subjects which often inhibit agreements even in the favourable sort of cases described above are rate retention during and after retraining, rates on newly created jobs and seniority versus merit in deciding who is to be retrained. None of these are as tricky as the seniority boundary issue.

- c) When displacement involves relocation of workers to a new community albeit with the same employer and union, the experience has not been encouraging. Agreements often provide for relocation allowances but workers appear reluctant to leave their communities¹². The General Steel Wares and CNR London cases demonstrate this. Unfortunately, the least mobile include the older workers who often have the greatest difficulty in finding other work in their home towns. Inter-regional migration does occur in response to differential employment opportunities but there is a time lag in this sort of adjustment. Where there is considerable displacement in areas which otherwise are enjoying expanding employment opportunities, there is no serious problem. Severance pay and unemployment insurance often are adequate to tide men over between jobs.

When displacement occurs in declining labour markets, then collective bargaining appears to be impotent. So far at least few union-management cooperative efforts have succeeded in arranging for significant geographic mobility. It would seem that the inducements required are far in excess of anything most companies would

¹² There is no need here to repeat the findings of the numerous studies on worker mobility. See WINDER, « Structural Unemployment », Kruger and Meltz, *The Canadian Labour Market* for a review of this literature.

be willing or able to pay. The answer here lies in state programmes designed to bring jobs to these depressed regions and/or to move excess manpower out by providing much greater inducements than private employers can offer.

- d) Equally unsuccessful have been schemes to provide retraining to workers to prepare them for jobs with other employers. Workers rarely, if ever, show much willingness to bear any portion of the cost of such retraining whether in the form of lost earnings or tuition fees. Even where companies provide such opportunities without cost to their employees, workers seldom take advantage of these programmes. The Armour, General Steel Wares and Domtar experience provide examples of the failure of these retraining efforts. Workers are willing to retrain for a *specific* job with their *own* firm and often beg for the privilege. Some workers have shown a willingness to undertake retraining once unemployed but even here the drop-out rate is quite high. Retraining programmes that focus on developing academic or general use technical skills rather than specific skills geared to a specific job appear to be the least successful. Yet it is precisely such general training that receives the blessing of most of our self-proclaimed authorities on manpower policy.

This apparently irrational resistance of workers to retraining is difficult to explain. Perhaps the problem should be turned over to social scientists of other disciplines (psychology and sociology) for an answer. At the risk of being accused of academic imperialism, or of trespassing on the jurisdiction of others, I will hazard a few observations on this matter.

First, workers appear to have a short time horizon in making plans. They do not appear willing to sacrifice much today for benefits in the future because they assume that benefits will not flow for very long. This may explain their reluctance to save or invest, and their preference for credit buying. It may reflect their experience with layoffs involving the loss of accumulated « capital » in the form of seniority and fringe benefits on changing employment. It may also reflect the increasing selectivity of entrants to the lower skilled jobs which are the centre of our attention. Such workers increasingly are *voluntary* drop-outs from formal education. They either lack academic aptitudes (which explains their resistance in later life to academically oriented programmes) or they refused to invest in further academic training in their youth because they tended to discount heavily the

gain in future income from such investment¹³. They are then unlikely to be willing to sacrifice much for training later in life when the future period of payoff is in fact even shorter and so soon after experiencing the bitterness of displacement. To get workers to make the effort, a specific job opportunity must be shown and the training closely related to success in filling the job. It is this which accounts for the success of retraining in the case of in-plant job transfer.

- e) Our sample includes two cases which further demonstrate the point just made – namely the need to show workers concrete opportunities to elicit their own effort at readjustment *prior* to displacement. These occurred in General Steel Wares and Ontario Hydro where the National Employment Service was brought in to facilitate adjustment. In the General Steel Wares case, the company supplemented N.E.S. efforts with its own approach to other prospective employers. Workers were enabled to secure job interviews and offers of employment *before* being displaced. The programmes were successful. Success was, of course, predicated on the existence of alternative employment opportunities in the community.

If retraining is to succeed (in cases where a change of employer is necessary) it must be tied to such a programme. The actual retraining should be done by the *new* employer rather than the firm laying the men off, although varying schemes for *financing* retraining can be used. Workers are more likely to accept retraining if it is tied to a job with the firm insisting on the retraining. Furthermore the training is bound to be more relevant to the new jobs if done by the firms with the jobs available than if done by the firm laying off manpower. The new employers are in a better position to define training requirements and are more likely to have the equipment and instructors to do the training than are the former employers of these workers. They also have a stronger incentive to ensure that training is efficient.

The Ontario Hydro and General Steel Wares use of N.E.S. provides one of the few inspiring innovations encountered in this study. Paradoxically, this approach is much less costly to management and less disruptive to the workers than many of the more popular con-

¹³ Major exceptions are recent immigrants and disadvantaged groups (U.S. Negroes, or Indians, etc.) who may have the aptitudes but lacked opportunities or found that the « costs » (including breaking strong cultural patterns) were unduly high.

tractual arrangements. The widespread use of advanced notice and joint committees provides the basis for more experiments of this kind in the future.

- f) Funds available to cope with displacement problems were established in four of the cases studied. While this approach has received considerable publicity, nothing startling has been accomplished in any of these cases.

The Armour plan provides for considerable flexibility in the use of the funds. Much careful effort was expended in devising programmes to assist the displaced. However all published reports indicate that there was very limited success in spite of good will, expert assistance and large expenditures.

The Kaiser and Pacific Maritime plans are tried to productivity gains. In the Kaiser case, the funds are used for bonuses to elicit worker effort and cooperation in the way that the well known Scanlon Plan operates¹⁴. Along with the fund, Kaiser has accepted an obligation not to lay off its existing work force for reasons of technological change but to use attrition to accomplish any necessary reductions. The fund does nothing to ease displacement which *can* occur for reasons of declining demand or which *can* hit newly hired workers as a result of any cause including technological change.

The Pacific Maritime fund is somewhat more closely tied in with displacement adjustment programme. Some of the funds are used to induce early retirement where necessary, while the balance are available to maintain the incomes of union members who are laid off for reasons of technological change. There is no protection for union members against layoff resulting from other causes. More important, the large group of « B » longshoremen are excluded from union membership and from any protection against displacement. Thus the fund and the other contract provisions help an elite group but provide no protection for those workers most likely to be hit by displacement.

In Canada, the major case involving the creation of a fund is at Domtar. Here the fund is to be used for any devices the parties may feel will facilitate the adjustment of displaced workers. Thus far the future of this plan is uncertain because of the failure of a

¹⁴ The Scanlon Plan is discussed briefly in the volume by F. Lesieur (ed.), *The Scanlon Plan*, Cambridge, Mass. : M.I.T. Press, 1958.

number of unions to accept some of the terms. Domtar provides a very interesting case of a large multi-plant, multi-product company organized by a large number of unions (many of them at loggerheads with each other). The environment would appear to be most unfavourable to success. Yet in spite of the current deadlock, the fact that negotiations have proceeded as far as they have and that the majority of unions appear ready to make the concessions necessary (including some loss of autonomy and acceptance of inter-union seniority) is truly remarkable.

- g) Attrition is widely used as a device to ease displacements problems. Actually what it does is redistribute the burden of displacement. The older workers, often against their desires, are compelled or induced to accept displacement. Their retirement is accompanied by pensions to make it more palatable but it does not alter the fact of their displacement. Such plans are, in effect, a form of S.U.B. designed to be paid to those with the lowest life expectancy and therefore to those who are least expensive to support in this matter. It fits in with the accepted notions that the aged are entitled to financial support, with equity concepts concerning the prior right to employment of those with more dependents than the aged usually have and with the employers' preference for keeping younger rather than older workers if faced with the choice. Nonetheless, it still involves displacement. To the extent that the displaced are assisted, it is through the pension plans and *not* through attrition *per se*.

The attrition policy also raises the issue of « silent firings » or displacement of *potential* workers often young new entrants to the labour force. It is argued that, to the extent that people would have been fired on in the absence of technological change, but are not employed because of the change, there is displacement as a result of the change. These people, of course, receive no protection from any of the contractual arrangements since they were not covered by the relevant agreements.

Other Proposals — An Evaluation

The extensive discussion of technological change in recent years has generated a number of proposals for handling the problem. The Freedman Report (Report of the Industrial Inquiry Commission on Canadian Railways « Run Throughs ») and the statements by the Economic Council of Canada provide two widely publicized examples of such proposals. It is impossible to treat all of the plans here but I feel that some con-

sideration should be given to these two widely discussed Canadian schemes. Some reference will be made to other plans as well.

THE FREEDMAN REPORT

Although Freedman addressed himself to a particular displacement problem in a single industry, there has been considerable discussion of his proposals and their possible extension beyond the railway case. Freedman deals with several contentious issues including :

- (i) the residual rights versus common law approach to collective agreements ;
- (ii) the rights of unions and workers threatened by displacement ;
- (iii) the rights of a community threatened by displacement ;
- (iv) the responsibilities of companies, unions and the state in assisting worker adjustment to displacement.

We will deal with each of these in turn.

- (i) Freedman concedes that under existing law the residual rights doctrine prevails and supports management's contention that it can make any changes unilaterally unless specifically restricted by the terms of contract. He sees the necessity of preserving management's residual rights yet also accepts the merit in the union's contention that workers have property rights in their jobs which must be respected. The conflict is particularly sharp in the event of technological change. Freedman proposes that — management give thirty days advanced notice of such change and discuss with the union methods of facilitating adjustment

— if an arbitrator finds that the proposed change will result in substantial displacement and if the parties cannot agree on arrangements for implementing the change, that the company be compelled to delay the introduction of new processes until after the agreement expires and the union can bargain over the issue with the support of a strike threat.

Both proposals are radical. While many companies might accept advanced notice, few would like to be compelled to do so by law. More significant is the second proposal which would result in delaying any major changes until the expiration of agreements. This in effect destroys management's residual rights where major technological change is the issue. It may also result in sizeable economic losses to the company as a result of the imposed delay. To overcome this

objection, Mr. Marchand has proposed that in the event management asks to implement a major change, the contract expires immediately and the parties open negotiations on this and related issues with a view to concluding a new agreement.

These proposals deserve consideration. Earlier I argued that in most cases, companies know of impending changes long before they are prepared to implement them. A legal requirement of thirty days advanced notice should not prove to be unduly onerous. As for making such changes negotiable, the « Marchand amendment » is preferable to the original Freedman plan. Marchand's proposal makes major change negotiable without necessarily imposing undue delays.

There are several problems raised by these proposals. First there is the difficulty in distinguishing between a minor change (where residual rights govern) and a « material » change. Then there is the danger that management may implement change in stages with each step involving a minor alteration but with « material » change occurring over time. Arbitrators may have problems deciding these questions. Any adequate decision will involve lengthy hearings which themselves impose delays.

- (ii) The Report says that unions and workers have the right to advance notice (as discussed above) in the event of technological change. Displaced workers should be assisted in geographic mobility by the company. Specifically moving costs including loss of capital value of housing or expenses in breaking leases should be covered. Freedman contends that these workers should not bear the full cost of change and that management must be prepared to spend some of its economic benefits resulting from the change on these workers. He *implies* that if the cost of assisting displaced workers in this way exceeds the benefits to the company of making the change, then the change should not be made. He limits himself to the railways and does not face up to the problems of industries where import competition or entry are more likely to create pressures for technological change. He neglects the evidence on the unwillingness of workers to move even if incentives are provided. The Report devotes little attention to other adjustment programmes.
- (iii) In cases where a single firm is a major employer in a community, company decisions may adversely affect the community destroying considerable investment in social overhead capital (schools, roads, etc.). Freedman recognizes the community interest in these cases

and recommends advanced notice to the community. In the railway case, he suggests a device for delaying change in such cases but his proposal is not immediately applicable to other industries. He does not resolve the problem of ensuring the protection of community interests. Nor does he really treat systematically the question of forcing companies to consider these social costs in their decisions. The subject of « externalities » is of great importance in assessing many private decisions (pollution, safety, etc., as well as worker displacement) and one that economists recognize as extremely difficult to treat analytically. If all social costs had to be considered before any change could be made, few innovations would ever be adopted. On the other hand, if external effects are completely ignored, many socially undesirable changes will occur.

- (iv) Companies, unions and governments are urged to accept some responsibility for promoting change and facilitating worker adaptation to change. Management's responsibilities as seen by the Report have been indicated above. Unions are encouraged to cooperate with management and to accept necessary changes in their philosophy and structure. Freedman was particularly concerned about union insistence on narrow seniority units on the railways which frustrated attempts to cope with displacements.

The state was to assist in manpower adjustment and was to reimburse companies for any economic losses resulting from imposed delays in implementing change. This would induce companies to accept delay and to work out arrangements with communities and unions to minimize their hardships. One wonders how one could establish the size of this subsidy and prevent serious abuses by companies. It seems to me that there is enough time in most situations to permit adequate advanced notice without any loss by the company or any necessity for compensation. If compensation is to be paid, the onus should be on the companies concerned to demonstrate losses attributable to imposed delays that would not otherwise have occurred.

In summary, the Freedman Report is thoughtful and thought-provoking. It combines a diagnosis of the problems of the parties immediately involved with consideration of social costs and social concerns. The analysis is not explicit nor precise on this matter but Freedman does demonstrate an awareness of the complex problem. Although his principle concern is the railways, much of the discussion has broader significance. I would be prepared to accept compulsory advanced notice. There is merit in the

suggestions that material change should be subject to the bargaining process (including the threat of stoppage) and that it is unreasonable to permit unilateral management action on major changes during the term of contract. Unless something is done here, we may anticipate bitter strikes over the principle of residual rights. Although I am critical of the Report's failure to cope adequately with the problem of introducing social costs into management's decisions, I concede that this is a problem where our analytical tools remain underdeveloped.

THE ECONOMIC COUNCIL

The Economic Council of Canada has issued three publications relevant to this topic. The first and most significant was *A Declaration on Manpower Adjustments to Technological and Other Change* issued November 1966. The Council discusses the various provisions that have been used in collective bargaining and urges wider adoption of these adjustment provisions. The Declaration adds to our earlier list of contractual arrangements the use of portable pensions to facilitate labour mobility. Great stress is placed on the need for advanced notice and joint consultation. The Declaration states that normally management knows of impending change well in advance of implementation so that advanced notice is not unduly burdensome. The fact that representatives of management joined union officials in signing the Declaration lends support to our earlier argument that economic theory suggests the existence of a substantial time lag in most cases. The Council statement notes that public policies designed to promote full employment are *the* key to the success of *any* programmes designed to facilitate the adjustment of displaced workers.

The basic role of Keynesian policies in this matter is something that almost all economists can agree on. Other programmes are designed to shift displaced workers to vacant positions. No such shift is possible unless the vacancies exist or are created. The spread of portable (vested) pensions would be useful. However, it would tend to raise the cost of pension plans and perhaps limit the ability to resort to induced attrition. There is little to quarrel with in this Declaration but there is little that is new, revolutionary or thought provoking.

The Council issued another statement in February 1967. This document entitled *Toward Better Communications Between Labour And Management* asserts repeatedly that better communication provides good results for all concerned and contributes to a long list of goals including

adjustment to displacement. Little proof is offered in support of these statements. In my opinion much that is said shows either naivete on the part of those formulating the document, or else a preference for consensus on general, rather harmless assertions over a careful examination of the problems. Here I will limit myself to the comment that improved communications can make a material difference only where the parties have shared objectives unknown to themselves which can be discovered by discussion. Where there is genuine disagreement, communications *per se* are unlikely to help much and indeed can be harmful by pointing out areas of disagreement that were not apparent.

In March 1967, the Council published Jean-Real Cardin's study *Canadian Labour Relations in an Era of Technological Change*. Cardin argues that the failure of collective bargaining in this area is largely the result of the interaction of outmoded union and management philosophy and archaic institutional structures. Bargaining units are relatively small and the focus in bargaining is on the goals of « actors » at the micro-level, (firm, craft, etc.). Adversary roles are emphasized with discussion confined to the infrequent periods when contracts must be redrawn.

His solution lies in broadening both the bargaining units and the perspective of the parties. The Swedish system appears to be his model of the ideal although he does not explicitly state this.

Although much can be gained by expanding bargaining units so that mobility is facilitated, I see little in Cardin's proposals that are likely to improve the situation. Our unions and companies are unlikely to accept national bargaining on the Swedish pattern. Here the presence of international corporations and international unions does make a difference although other factors also operate to inhibit centralization. Cardin puts great stress on communication as desirable *per se*, something I have already questioned. Finally, we should not confuse the functions of the state (with or without the participation of interest groups) in setting macro policies and the function of unions and collective bargaining in seeking to assist workers in coping with what is unique to their own situation. In the drive for centralization, we may lose much that is healthy and useful in our currently decentralized arrangements. In our attempt to remake collective bargaining so that it can cope with displacement we may destroy its ability to perform what it has done so well in the past.

Cardin's basic proposals are unlikely to be followed. I am not convinced that they would prove effective even if they did materialize.

Summary

The following appear to be the major findings of this study :

- a) Measuring the rate of technological change at the macro or micro level is difficult.
- b) The employment impact of technological change is almost impossible to separate from other factors causing displacement.
- c) Technological change is *not* inherently labour displacing.
- d) Normally, in cases of major change, there is a considerable period between the decision to alter technology and the actual implementation of this decision.
- e) Dislocation can arise from a variety of sources in addition to technological change. The problem we face is dislocation regardless of its source, and not technological change *per se*.
- f) Firms making the change may not always be highly profitable. Often they act under the stimulus of losses.
- g) Where entry into an industry is possible (or import competition exists), new entrants (or foreign competitors) use the latest techniques with no demand on them to compensate displaced workers. Older firms shifting to new techniques are asked to implement costly assistance programmes. Often these firms are simultaneously burdened by the competitive disadvantage of heavy fixed changes associated with the purchase and use of older techniques. This two fold pressure to overcome the burden of fixed costs and to assist displaced workers when competitors face neither pressure can create serious hardships for these firms.
- h) Worker costs and benefits associated with change depend on worker values, prior training and experience, and conditions in the relevant labour markets. Hardest hit are the lowest skilled and the least willing to move. Management's decisions are motivated primarily by profit maximization. The government's approach is contingent on the relative importance attached to a variety of social and economic goals as well as on the political pressures of the moment.
- i) Most of the studies of collective bargaining and displacement are of two kinds. Some are limited to case descriptions. Others proclaim general principles or panaceas on the strength of hunches rather than tested hypotheses. Definition, methods of classification and methods of analysis are not comparable. No theoretical structure guides the studies. Thus little can be done to integrate them or to employ their findings in testing hypotheses. This Report contains a deficient but

nonetheless valuable beginning at a more systematic attack. There is some evidence that certain of the environmental variables are significant in predicting the likelihood of particular kinds of contractual provisions.

- j) Our cases also produced other findings :
- Displacement that does not involve moving out of one's community or shifting to another employer (or union) are the easiest to cope with through collective bargaining.
 - Workers do not take advantage of mobility grants. This means that when displacement occurs in an area with few alternative employment opportunities, collective bargaining is virtually impotent in assisting workers.
 - Workers are not likely to accept retraining unless they are certain that training is tied to a specific job vacancy, preferably at a firm that employs them and provides the retraining.
 - Limited seniority units particularly in multi-union situations inhibit adjustment arrangements. Although there have been some notable instances of success in altering union policies, these are few in number and more than matched by the cases of failure to adjust even in the face of severe displacement problems.
 - More use should be made of the facilities of the Manpower Centres and of company and union contacts in the labour market to facilitate worker adjustment. The Ontario Hydro and General Steel Wares cases might be emulated by others.
 - Displacement funds have not accomplished much of significance thus far.
 - Attrition is a mechanism for allocating the burden of displacement and not a remedy.
- k) The Freedman Report touches on a number of important issues and makes some interesting proposals. It urges compulsory advanced notice arrangements and rejects management's residual rights in cases where a change will result in material displacement. These are radical suggestions. The Report touches on the question of community costs associated with such change and the need to bring consideration of these to bear on management's decisions. This issue is not resolved in the Report.
- The work of the Economic Council of Canada thus far is disappointing. The Council has pressed for the wider use of some of the procedures followed in the cases we have examined. It has pushed some questionable panaceas which have little basis in

careful analysis and little likelihood of ever being implemented. The most valuable contribution it has made is in pointing out the crucial role of government aggregate demand policies in determining the degree of possible success of collective bargaining in this area.

L'ASPECT ÉCONOMIQUE DE L'ADAPTATION AU CHANGEMENT TECHNOLOGIQUE

L'adaptation aux changements technologiques n'est pas un sujet nouveau. La hausse du chômage de 1957-60 et le développement technologique ont amené ce débat, il y a déjà dix ans. Les économistes ont discuté le rôle relatif des facteurs structurels et de l'insuffisance de la demande agrégative comme cause majeure de ce chômage. Les keynésiens ont prôné des politiques fiscales et monétaires, les structuralistes ont avancé des politiques de main-d'œuvre comme solutions à ce problème, tandis que d'autres remettent en question la situation en suggérant l'approche de la société des loisirs.

Nous n'avons pas l'intention de régler ces vastes questions ici. Nous faisons l'hypothèse que l'emploi rémunéré va continuer à jouer un rôle important dans notre société et que les changements technologiques et autres vont continuer à causer des déplacements de main-d'œuvre. Le but de cet article est double : d'abord, examiner comment la négociation collective a traité ce problème de déplacement ; ensuite, voir quel genre de tendance les changements mentionnés peuvent inculquer aux relations du travail et à la négociation collective.

Nous examinons d'abord l'aspect coût-bénéfice des changements technologiques. Nous concluons que la théorie économique de la firme nous porte à croire que, dans la majorité des cas, le côté patronal a tout le temps disponible de planifier en fonction des changements causant de sérieux déplacements. Il est à noter que les entreprises qui font des changements ne sont pas toujours celles qui ont les plus grandes marges de profit. Quand l'entrée dans le marché est facile et la concurrence étrangère sérieuse, la firme qui introduit d'importants changements fait face à de sérieux désavantages vis-à-vis ses concurrents.

Ensuite, vient une analyse de conventions collectives basée sur des inventaires des gouvernements fédéral et ontarien. Il s'agit de vérifier neuf hypothèses afin de voir, entre autres choses, l'influence des différents contextes sur le contenu de la négociation collective et la direction qu'elle prend. L'analyse de cas spécifiques met en évidence quelques-unes des raisons principales pour les faillites et les succès de la négociation collective face aux changements technologiques

La discussion continue par une analyse des principales solutions canadiennes au problème des déplacements de main-d'œuvre et un résumé des principales conclusions :

- a) l'évaluation du taux de changement technologique aux niveaux macro et micro est difficile ;
- b) il est presque impossible de distinguer entre l'impact des changements technologiques sur l'emploi et les autres causes de déplacement de main-d'œuvre ;
- c) il y a une grande période d'attente entre l'innovation et l'implantation des nouvelles technologies ;
- d) les changements technologiques n'impliquent pas nécessairement des déplacements de main-d'œuvre ;

- e) il y a plusieurs causes à ces déplacements autres que les changements technologiques ;
- f) les entreprises qui introduisent les changements technologiques ne sont pas toujours celles qui ont les plus grandes marges de profit ;
- g) les plus anciennes firmes dans un marché subissent la double pression des innovations technologiques et de l'assistance aux déplacements de travailleurs ;
- h) les travailleurs non-qualifiés sont les plus affectés par les changements d'emploi et plus résistants face aux déplacements géographiques ;
- i) l'absence de cadre théorique pour étudier l'impact de la négociation collective sur les taux de déplacement empêche toute comparaison et l'intégration des différentes études. Cet article n'est qu'un premier pas dans ce sens. Il semble y avoir une corrélation positive entre certains genres de clauses dans les conventions collectives et certaines variables contextuelles ;
- j) les déplacements de main-d'œuvre qui n'impliquent pas de mobilité géographique sont les plus faciles à solutionner par la négociation collective ;
- k) les travailleurs ne se servent pas des primes à la mobilité. Ceci implique l'impuissance de la négociation collective lorsqu'il y a déplacement de main-d'œuvre dans une région à basse opportunité d'emploi ;
- l) les travailleurs vont accepter le recyclage seulement si un emploi leur est assuré ;
- m) l'existence d'unités d'ancienneté limite les possibilités d'adaptation surtout dans les cas de pluralisme syndical ;
- n) on devrait faire un plus grand usage des Centres de main-d'œuvre et des contacts que les syndicats et la compagnie ont avec le marché du travail pour faciliter l'adaptation des travailleurs ;
- o) les fonds de déplacement n'ont pas eu d'impact à date ;
- p) l'usure de la main-d'œuvre n'est pas un remède aux déplacements.

Le rapport Freedman et le Conseil économique du Canada ont également étudié ce problème. L'un contient, entre autres, quelques recommandations radicales, alors que le travail du second est très désappointant.

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APPENDIX 1
CHART 1*

COMPANY OR INDUSTRY	PROVISIONS OF CONTRACT											No. of Plants Studied													
	A. Advanced Notice	B. Avoiding Layoff	Natural Attrition	Induced Attrition	Retraining	-Co. Paid	-Shared Cost	Relocation	-With Allowance	-Without Allowance	Transfer (seniority)		Work Spreading	C. Income Maintenance	Severance Pay	S.U.B.	Preferential Hiring	Rate Retention	-Permanent	-Temporary	Short Week Benefits	D. Productivity Sharing	E. Joint Committees	Creative Administrative	F. Estab. of Fund
Alberta Telephone	x	x	x	x			x															x			
Bowater	x			x						x							x						x		
Can. Johns-Mansville	x	x		x						x							x						x		
CNR - London, Ont.	x	x	x	x			x			x			x										x		
Casavant Frères	x			x						x													x		
Cleyn & Tinker	x	x		x						x							x						x		
General Steelware	x	x	x	x			x			x			x										x		
Hydro - Ont.	x	x		x						x						x							x		
Imperial Oil	x	x	x		x		x			x			x											x	
Molrs Ltd.	x	x								x															
Pacific Press	x	x		x						x			x										x		
American Motors								√				x										x	x		
Armour	x		x	x			x			x			x	x									x	x	
Basic Steel												x											x		
Domtar	x	x	x	x			x			x													x	x	
Imperial Oil - loco	x	x	x	x						x			x										x	x	
Kaiser Steel		x		x											x							x	x	x	x
Pacific Maritime		x	x							x													x		x
Quebec Iron																							x		
Railways-Kellock			x		x					x							x						x	x	
PLAUTZ ¹																									
Chemical Industry	3			-			1		5	-	3		2	3						1				94	
Machinery "	3			2			1		4	-	-		5	-						-				106	
Meat Products "	6			-			-		-	-	6		-	2						-				33	
Metal Fab. "	13			8			5		18	-	2		12	2						-				252	
Paper & Allied "	55	1		2			-		2	-	21		-	25						-				99	
Petrol. & Coal "	2			1			-		1	-	-		-	1						-				11	
Primary Metals "	7			4			-		8	-	2		2	5						-				92	
Printing, etc. "	33	6		6			-		-	4	19		-	1						-				231	
Rubber "	3			-			-		7	-	-		2	-						2				29	
Trans. Equip. "	-			2			9		7	-	-		8	-										76	

¹ For the Plautz cases, I have indicated the number of establishments studied in each industry and the number with each kind of provision in each industry.

* This table relates the companies or industries to the different kinds of arrangements found in agreements. The √ indicates a contract clause which predates the agreements discussed in the Appendix. The x indicates that the clause was negotiated in the contracts dealt with in the description in the Appendix. It was not possible to analyse agreements in all cases and undoubtedly more it should be included particularly in areas like seniority and severance pay.

APPENDIX 2
CHART 2*

COMPANY OR INDUSTRY ENVIRONMENT	PRODUCT MARKET	LABOUR MARKET	EMPLOYMENT OPPORTUNITIES	SCOPE OF COLLECTIVE BARGAINING EMPLOYER UNION			LABOUR FORCE			
				Competitive Oligopoly Monopoly	Co. Dominated Many Employers	Expanding Contracting		One Plant More than One Company More than One	One Union More than One Craft Union(s) Industrial Union(s)	Small (under 500) Large (over 500)
Alberta Telephone		x		x		x	x		x	
Bowater	x		x		x	x		x	x	
Can. Johns-Mansville	x		x		x	x		x	x	
CNR - London, Ont.	x		x			x	x		x	
Casavant Frères					x	x		x	x	
Cleyn & Tinker	x		x		x	x		x	x	
General Steelwares	x		x	x		x	x		x	x
Hydro - Ont.		x				x	x			x
Imperial Oil	x		x	x		x	x			x
Moirs Ltd.			x	x		x	x			x
Pacific Press	x		x			x	x		x	x
American Motors	x		x	x		x	x		x	x
Armour	x		x	x		x	x		x	x
Basic Steel	x		x	x		x	x		x	x
Domtar	x		x	x		x	x		x	x
Imperial Oil - loco	x					x	x		x	x
Kaiser Steel	x		x	x		x	x		x	x
Pacific Maritime			x	x			x		x	x
Quebec Iron	x		x	x		x	x		x	x
Railways-Kellock	x		x			x			x	x
Chemical Industry	x									
Machinery "	x									
Meat Products "	x									
Metal Fab. "	x									
Paper & Allied "	x									
Petrol. & Coal "	x									
Primary Metals "	x									
Printing, etc. "	x									
Rubber "	x									
Trans. Equip. "	x									

* This Chart assigns environmental characteristics to each case. Judgment was used in many instances. In some cases, particular environmental factors are not designated because of lack of information.

APPENDIX 3
CHART 3*

COMPANY OR INDUSTRY ENVIRONMENT	PROD-UCT MARK-ET	LAB-OUR MARK-ET	EMPLOY-MENT OPPORT-UNITIES	SCOPE OF COLLECTIVE BARGAINING EMPLOYER UNION 2								LABOUR FORCE	Total No. of Cases						
				Competitive Oligopoly Monopoly	Co. Dominated Many Employers	Expanding Contracting	One Plant	More than One	One Company	More than One	One Union			More than One Craft Union Industrial Union	Small Large Old				
A. Advanced Notice	2	8	2	6	7	2	7	6	8	14	0	5	9	6	11	4	9	1	14
B. Avoiding Layoff																			
Natural Attrition	1	9	2	5	7	4	5	5	0	13	1	6	8	6	12	4	10	1	14
Induced Attrition	0	5	1	1	7	3	3	1	0	7	1	3	5	2	8	3	5	1	8
Retraining																			
Co. Paid	2	10	2	6	9	4	5	6	1	15	0	6	9	6	14	4	11	1	15
Shared Cost	0	1	0	0	1	0	1			1	0	0	1	0	1		1		1
Relocation																			
With Allowance	1	5	1	1	6	2	4	0	6	7	0	2	5	2	7	2	5	1	7
Without Allowance				0	1	1	0	0	1	0	1	1	0	0	1		1		1
Transfer (Seniority)	2	11	1	7	9	2	8	6	9	15	1	6	10	7	14	4	12	1	16
Work Spreading	0	3	0	0	3	1	2	0	3	2	1	2	1	0	3	0	3		3
C. Income Maintenance																			
Severance Pay	1	6	0	1	6	1	3	2	5	6	1	3	4	2	7	3	4	1	7
S.U.B.	1	3	0	1	4	2	3	1	3	3	2	4	1	0	5	0	5		5
Preferential Hiring	0	1	1	1	1	-	-	0	1	2	0	0	2	2	0	0	2		2
Rate Retention 1	1	2	0	3	0	0	3	2	1	3	0	2	1	1	2	1	2		3
Permanent		1	0	0	1			0	0	1	0	0	1	1	0		1		1
Temporary		3	0	0	3	1		2	0	3	0	2	1	1	2		2		3
Short Work Benefits	0	2	0	1	2	1	1	1	1	1	2	3	0	0	3	0	3		3
D. Productivity Sharing	0	2		0	2	1	1	1	1	2	0	2	0	0	2	0	2		2
E. Joint Committees																			
Creative	2	11	2	7	9	4	7	6	10	15	1	8	8	5	15	4	12	1	18
Administrative		2	0	0	3	1		1	1	2	1	2	1	0	3	1	2		3
F. Establishment of Fund	1	3	0	1	3	2	2	1	2	3	1	2	2	1	4	0	4		4
Total No. of Cases	2	13	2	7	12	5	9	7	11	18	2	9	11	7	18	4	15	1	20

* This Chart combines information from Charts 1 and 2 to relate the environment and the response. Only the Cowan and Kruger cases are included here. The Plautz (Ontario) cases could not be used.

1 Rate retention covers cases where it is unclear whether it is permanent or temporary. Where this is clear it is so listed. Thus total cases of rate retention of any kind is seven.

2 NOTE: Some companies have both craft and industrial unions.