Document generated on 10/12/2024 1:43 a.m.

Relations industrielles
Industrial Relations

Manpower Coefficients and the Forecasting of Manpower Requirements in Nova Scotia

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Volume 22, Number 4, 1967

URI: https://id.erudit.org/iderudit/027839ar
DOI: https://doi.org/10.7202/027839ar

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Publisher(s)

Département des relations industrielles de l'Université Laval

ISSN

0034-379X (print)
1703-8138 (digital)

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Cite this article

Proulx, P.-P. (1967). Manpower Coefficients and the Forecasting of Manpower Requirements in Nova Scotia. *Relations industrielles / Industrial Relations*, *22*(4), 565–568. https://doi.org/10.7202/027839ar

Article abstract

«... Devising a workable manpower plan... at best is an art, still in its infancy. Many assumptions and informed judgment are necessary to compensate for gaps in data. But if planning of any sort were delayed until our data were complete and a fool-proof methodology were developed, no forecasts of educational needs would ever be made. The enormous outlays on education today and in the future demand that we at least make an attempt to determine how we can best allocate these expenditures to meet our needs efficiently. As additional data become available and greater experience is gained in the techniques of manpower planning, many of the difficulties facing us will be overcome. Manpower forecasting although not an ideal approach to rational development of our educational resources at least provides a framework of additional required data that no other currently-known method offers ». [1]

We are attempting to calculate « manpower coefficients » or if you wish, a fraction whose numerator is man-years of experienced labour by occupation group, and whose denominator is output by industry group. In other words, we shall estimate the number of man-years of labour of different occupation groups required to produce $1,000.00 of output in selected industries in Nova Scotia, in 1960-61. The fraction is no more and no less than an estimate of labour productivity.

We have asked the Dominion Bureau of Statistics to provide a tabulation containing the experienced labour force in 1961, cross-classified,

1) by sex,

2) by class of worker (wage and salary earners, unpaid family workers, own business operators),

3) by industry group (54),

4) by occupation group (64),

5) by earnings group,

6) by years of schooling,

7) by weeks worked,

8) by hours per week,

9) by age group.

We shall prepare a 64 (row) by 54 (column) matrix, one column for each industry group and one row for each occupation group. Each cell will contain a fraction which when applied to a forecast of gross value of output by industry will provide an estimate of the number of man-years of labour required to produce that output. If we sum across the rows we obtain the total demand for man-years of labour for each of occupation groups.

I shall dispense with a discussion of the majority of the assumptions, limitations and peculiarities of the method, for these may be found in the report mentioned above.

To obtain the numerator of our fraction (man-years of experienced labour force), we weighted bodies (the experienced labour force) by two fractions; one for weeks worked and one for hours worked. This is particularly important in Nova Scotia because of seasonal operations. If we found a person who had worked 26 out of the 52 weeks proceeding the 1961 levels, and when he worked, worked the model hours in his occupation groups, we counted him as 1/2 a man-year of labour.

One facet of the study which may interest individuals involved in training, retraining and education concerns the occupation groups we formed. We have grouped the 273 Census occupations of the 1961 Census into 64 occupation groups. We formed broad groups of occupations within which we believe workers are substitutable, transferable and interchangeable. This was done among other reasons because it is quite common to find workers with the same type of training in different occupations, or to put it differently because workers with one type of preparation often go into different kinds of jobs.

This approach also reflects a belief that it is more effective to train workers in families of related skills rather than in specific skills in preparation for the labour market. Another reason is that Census occupation definitions often leave much to be desired. We have therefore formed 64 occupation groups which are in many respects similar to Dunlop's « job clusters » and Scoville « job families » which are defined as groups of job classifications limited by technology, administration and social custom or « jobs linked by materials used, equipment used and functions performed ». We have in effect formed 44 groups of occupations on the basis of affinity in functions and another 19 (one group, the 64th is for unpaid family workers) which segregate superior from intermediate from unskilled workers in many of these groups of occupations. We arrived at the latter by using earnings and education criteria. The reason for doing so is that workers with very different levels of skill were placed together in one Census occupation group (for example, many « engineers » in Nova Scotia have no secondary school training and very low incomes according to the 1961 Census; apparently many were promoted by their wives when the Census enumerator came).

In many cases, we required that the worker meet *either* the earnings criterion *or* the education criterion depending upon the occupation group, and this among other reasons because we did not use *age* in the process. We neglected the use of an education criterion in most occupation groups except those in managerial, technical, professional and clerical categories.

Let me also mention that we transformed reported earnings to annual rate earnings to match to our criteria because we know that many workers worked part-time, or were away from work for various reasons during the 12 months which proceeded the 1961 Census. This allowed us to exclude from superior categories individuals with little qualifications who held multiple jobs and worked an abnormal number of hours. We have also asked the Dominion Bureau of Statistics to provide information on the educational attainment of the workers in our different occupation groups by sex. This will allow users to draw implications concerning the formal educational requirements needed to produce the forecasted output.

In conclusion, please allow me to mention what I believe to be some of the work required to improve our knowledge in this area.

Care should be taken in preparing forecasts of the gross value of production (including inventories), in 1960 constant dollars, for the industry groups chosen in our study. These output forecasts should not be obtained from employment forecasts for the application of man-power coefficients to output forecasts thus derived would be tautological. Many specific studies of industry productivity trends would be helpful to narrow the zone of ignorance of the forecasts obtained through the use of our manpower coefficients.

Much remains to be done to dynamize the manpower coefficients. We know that labour productivity (and hence the manpower coefficients) varies cyclically and all we have estimated is a fixed coefficient for 1960-1961. We also know that more frequent estimates of these manpower coefficients would allow us to determine how technological changes have altered them, although the robustness of manpower coefficients is improved by the fact that we have grouped industries and occupations.

Our coefficients are based on ex post data of employment and output rather than ex ante data on the demand for labour (employment plus vacancies) and for output. They are therefore influenced by labour supply as well as by labour demand, i.e. they are the result of the interaction of manpower requirements and supplies. Much remains to be done to arrive at an interacting supply and demand model, and the new vacancies data soon to be published by the Dominion Bureau of Statistics should help us to refine those models we can think up now.

Much remains to be done on the appropriateness of grouping occupations for training and retraining purposes, and on the criteria for doing so. Much analysis of the functional and employment requirements by occupation remains to be done for the use of sex, earnings and education, in this paper is certainly not fully satisfactory.

(1) B.M. WILKINSON, *Studies in the Economics of Education*, Occasional Paper number 4, Economics and Research Branch, Department of Labour, Canada July 1965, pp. 37-38.

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de rentes (au Québec et dans les autres provinces canadiennes) et aussi pour les pensions (fédérales) de la sécurité de la vieillesse.

Selon l'explication donnée en Chambre par le ministre du Travail, le gouvernement a envisagé d'une manière objective la question de la revalorisation automatique future des rentes de la CAT, mais le gouvernement n'a pas voulu cette année, selon l'expression du ministre, en faire une disposition particulière dans la loi, bien qu'on y avait songé; et cela surtout, d'après le ministre, à cause du coût supplémentaire pour les employeurs (lesquels, comme on sait, sont les seuls qui contribuent à la CAT), lequel serait occasionné par un tel ajustement automatique. Le ministre a ajouté que le gouvernement est bien conscient du problème et qu'il ne l'a pas abandonné. Il faut donc comprendre qu'il sera étudié plus tard, peut-être, avec l'ajustement automatique d'autres prestations payables par le gouvernement. [1]

A ce propos, il est à signaler qu'à date, à notre connaissance, il y a une seule province au Canada, celle de la Colombie-Britannique, dans laquelle les prestations périodiques sont sujettes à un accroissement automatique, selon l'indice des prix à la consommation. En substance, si cet indice augmente d'une année à l'autre de pas moins de 2%, les rentes seront accrues de 2% pour chaque augmentation de 2% de l'indice.

Manpower Coefficients and the Forecasting of Manpower Requirements in Nova Scotia *

PIERRE-PAUL PROULX

« . . . Devising a workable manpower plan . . . at best is an art, still in its infancy. Many assumptions and informed judgment are necessary to compensate for gaps in data. But if planning of any sort were delayed until our data were complete and a fool-proof methodology were developed, no forecasts of educational needs would ever be made. The enormous outlays on education today and in the future demand that we at least make an attempt to determine how we can best allocate these expenditures to meet our needs efficiently. As additional data become available and greater experience is gained

(1) Voir à ce sujet nos remarques dans *Relations Industrielles*, vol. 21, no 1, p. 96.

* A paper presented to the Nova Scotia Centennial Conference on Education, Halifax, Nova Scotia, September 22, 1967. This discussion summarizes a progress report of the same title prepared for the Nova Scotia Department of Labour in March 1967. A more elaborate discussion may be found therein. The method was developped in collaboration with colleagues M. Dagenais and R. Marcotte with whom the author is estimating manpower coefficients in Quebec.

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