Outline for a general review report of the highly qualified manpower survey

TO

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OUTLINE FOR A GENERAL

REVIEW REPORT OF THE

HIGHLY QUALIFIED MANPOWER SURVEY

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A Report Submitted to the
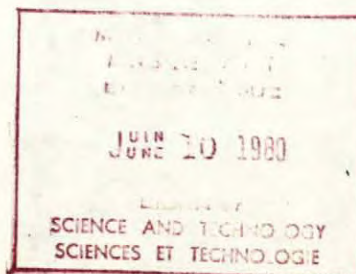Ministry of State for Science and Technology

November 30, 1973

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CONSULTANTS' REPORT

In accordance with the request of the Ministry of State for
Science and Technology we herewith submit our report entitled, "Outline
for a General Review Report of the Highly Qualified Manpower Survey".

Our report contains 10 chapters and 6 appendices. The chapters
outline in chapter by chapter form the topics and data needs related to a
General Review of the HQMS. The appendices contain materials pertinent
to the HOMS and might well be included in some modified form as appendices
in the General Review.

At various points in our report careful attention has been given
to the needs for Provincially disaggregated data. Two further issues are
also discussed: 1) the possibilities for record linkage with the 1971
Census; 2) approaches to highlighting critical aspects of the linkage be-
tween education and employment. We have been guided by appropriate HQMS
documentation in the preparation of this report.

The following criteria have influenced the number and content
of the chapters
    -the content of the HQMS itself
    -topic areas that would be of general and practical concern
    -to provide an adequate idea of the overall range of the data
    -to select topic areas that are congruent with the growing body
     of research and thinking on the relationship between education and
     employment

Within each data chapter (Chapters 4 through 9), we have specified a number of tables that should be produced. There is no expectation that all these tables would be included in the General Review.

Rather, these are all potentially important tables. After they are produced they can be scrutinized for their statistical and practical importance and the actual number of tables reduced through further editing.

Indeed, we have already drawn upon our experience and developed a reporting framework that already pre-selects in significant degree the total number of the tables to be included in the General Review. However, it would be irresponsible to conduct an even more intensive, second level, of editing until the data distributions can be seen.

We wish to emphasize how difficult it is to make such table specifications without seeing the data. There is a two way risk, including too many tables or including too few. We have honed down our selection as much as we feel we can responsibly do given our present level of information. Still, it is evident that many tables are being recommended. Two further strategies are available, however, to further reduce the table production burden. One is to discuss our outline with Ministry officials and further delineate the most critical reporting needs for the General Review. In other words, to refine the selection further by introducing policy considerations that the consultants are not at this point fully familiar with. The second strategy involves producing the basic distributions. The consulting team can then specify subsequent table selection in greater detail.

It was our judgement that we would best serve Ministry needs by producing a report such as we have. That is, a report which is comprehensive but still allows the possibility of further informed editing.

We should also like to emphasize that the data set of the HQMS represent a most unusually rich and complete information source. These data can, as our outline specifies, be used to formulate answers to an existing range of policy questions. The scope for further analysis beyond the General Review is enormous.

We are prepared to discuss with Ministry officials our report or other aspects of the HQMS at any time.

Edward B. Harvey

Thomas C. Corl

Toronto
November 30, 1973.

CHAPTER I

INTRODUCTION

This chapter can and should be relatively short. Its functions are to orient the reader to the Post Censal Highly Qualified Manpower Survey (HQMS), to state the basic rationale for the survey, and to provide enough overview of the succeeding chapters to permit readers to select that which is most pertinent to their needs.

The existing document "Basic Rationale for Highly Qualified Manpower Post Censal Survey" (see Appendix A) provides a valuable range of information on the objectives of the survey, for example

- evaluation of the role of highly qualified manpower in economic growth

- assembling information on problems of matching supply and demand in the highly qualified manpower sector

- establishment of a basic data file covering many aspects of the demographic, educational, occupational and employment status characteristics of highly qualified manpower in Canada

- the provision of such a data base for use in projections and future oriented scenarios designed to facilitate the planning process

- the realization of further information gains through record linkage with the 1971 census

In addition to this basic content, we would recommend the introduction make some brief allusions to the HQM survey in relation to other major studies of the education-employment link, notably work carried out under the auspices of the Science Council of Canada,[1] the Commission on Post-Secondary Education in Ontario[2], and the Carnegie Commission on Higher Education in the United States.[3]

1. Background Study for the Science Council of Canada, A.D. Boyd and A.C. Gross, Education and Jobs, Special Study No. 28, June, 1973.

2. Report of the Commission on Post Secondary Education in Ontario, Edward B. Harvey, Education and Employment of Arts and Science Graduates: The Last Decade in Ontario, August, 1971.

3. Carnegie Commission on Higher Education, College Graduates and Jobs: Adjusting to a New Labor Market Situation, 1971.

CHAPTER 2

THE DATA

This chapter could be treated as a technical appendix if so
desired. Nonetheless, we would emphasize the importance of reporting in
full and explicit detail the methods of sampling, data collection, data capture,
and potential sources of invalidity.

The statement of survey methodology (see Appendix B) is a useful
statement upon which this chapter could be based, in particular, items I
through 6.

1) Creation of the HQMS population file by extracting from the
   1971 Census sample file all those persons reporting a university
   degree.

2) Selection of a sample of these persons.

3) Manual identification of selected persons in Census returns
   and the recording of names and addresses.

4) Mail-out and follow-up operations carried out in Regional Offices.

5) Head Office coding, transcription and data capture.

6) Computer processing - editing, weighting and tabulation.

In addition to these kinds of information, we would recommend the
inclusion of four further items of information.

First, any special problems that emerge in the recommended data
analysis should be reported. As will become evident later, the data will have
to be "handled" and collapsed in various ways because of its great detail.
Although we cannot say what these special problems are until we have seen the data
print-out and held discussions with those producing this output, we would certainly
want to see such special problems ascertained and included in this discussion of
the data.

Second, to indicate levels of external validity, some efforts must be made to check the quality of the data. For example, marginal distributions on several variables can be compared to distribution on complete census data to at least crudely approximate external validity. The geographical distribution of selected occupations can be compared as in the dummy table below (Table 2.1)

Table 2.1   Proportion of Selected Occupational Categories in the Provinces: Census and HQM Data

Province	Occupation 1		Occupation 2		Occupation 3	
	Census	HQMS	Census	HQMS	Census	HQMS
	%(N)	%(N)	%(N)	%(N)	%(N)	%(N)
Total	100%	100%	100%	100%	100%	100%
	(N)	(N)	(N)	(N)	(N)	(N)

Total

Differences could be tested for statistical significance. The geographical distribution should also be extended to compare by the 20 largest metropolitan areas (or some selected number) that adequately covers the regions of Canada (See Section 7.2 and Appendix F).

An additional check could be provided comparing the distribution of degrees granted by selected institutions in selected years as a proportion of all B.A.'s - B.Sc.'s granted in Canada by all institutions in those years with similar proportions in the sample. Degrees conferred outside Canada would have to be excluded. An illustration follows (Table 2.2).

Table 2.2   Proportion of B.A.'s granted by Selected
                             Institutions: Comparison of HQM and
                             Other Distributions.

                                              Year of Degree

Institution*	1935 HQM	Other	1940 HQM	Other	1945 HQM	Other	1950 HQM	Other	1955-1970 HQM	Other
	% (N)	% (N)	% (N)	% (N)	% (N)	% (N)	% (N)	% (N)	% (N)	% (N)
University of Alberta										
University of British Columbia										
University of Dalhousie										
McGill University										
McMaster University										
University of Montreal										
Queen's University										
University of Saskatchewan										
University of Toronto										
University of Western Ontario										
York University										
Other										
Total	100% (N)		100% (N)		100% (N)		100% (N)		100% (N)	

*Selected Universities
        (See ftn. 4, Table 4.1)

        Third, some specification should be made of the coding procedures by which

responses to the occupation questions on the HQMS questionnaire were transformed into

the four digit Census Classification of Occupations (CCO). This would appear to have been

a fairly complex coding transformation that could have implications for how the occupational

data are interpreted and therefore more needs to be said about the exact procedures.

Fourth, it would be useful to see the existing sample size chart (see Appendix C) extended to form a more complete matrix specifying rates of response and other sample contingent information.

CHAPTER 3

THE ANALYSIS

The objective of this chapter is to specify the analysis employed
in the presentation of HQMS findings. After presentation of a basic overview
of the chapter in this introduction, a number of major topics are taken up
in order.

3.1 Objectives of the Analysis

The analysis of these data must first provide a profile of highly
qualified manpower in Canada. These distributions will show relative levels
of HQM supply by levels of certification and field of specialization. Second,
the analysis should focus on the utilization of highly qualified manpower. From
the point of view of general analysis this will examine patterns of employment
and career development. From the standpoint of policy-makers, these latter
data can shed light on the return on investment in various fields and degree
programmes. In particular, if some degree-field combinations have been under-
utilized, more careful examination of future manpower needs must precede large
subsequent investments.

The analysis should flow from the general to the specific. This is
reflected in the movement from gross distributions to career patterns, but also
the analysis should proceed toward more disaggregated units, for example, from
M.A.'s and Ph.D.'s in the social sciences to degree holders in Political Science,
Sociology, Economics, and Anthropology. In particular, these must be different-
iated from business administration and public administration, law, social work
and secretarial science.

The very detail that makes this survey so valuable is a source of problems in analysis and interpretation. For example, the questionnaire (Appendix D) includes 98 different fields of specialization and in the census classification of occupations there are approximately 19 major groups, 83 subgroups and 500 separate occupations. These classifications make up a useful taxonomy, but these units vary widely in status and most importantly content. A person with a B.Sc. in Chemistry or B.Eng. in Chemical Engineering might be comfortable in a range of occupations including some under the heading of management and administration.

3.2   HQMS Variable Groupings

In order to impose a greater degree of order on the many variables used in the HQMS we would recommend that they be grouped within certain categories that make sense both logically and empirically. The following listing suggests such categories. The variables are followed by HQMS identification numbers (see variable list, Appendix E).

List 3.2 HQMS Variable Groups

A. Distribution variables

            Municipality   (1)

            Age   (2)

            Sex   (3)

B. Field of Specialization

            for 1st degree   (6)

            for 2nd degree   (11)

            for 3rd degree   (16)

            for 4th degree   (21)

C. Credentials

       Number of degrees   (4)

       Type of 1st degree   (5)

       Type of 2nd degree   (10)

       Type of 3rd degree   (15)

       Type of 4th degree   (20)

       Time of 1st degree   (7-8)

       Time of 2nd degree   (12-13)

       Time of 3rd degree   (17-18)

       Time of 4th degree   (22-23)

       Place of 1st degree   (9)

       Place of 2nd degree   (14)

       Place of 3rd degree   (19)

       Place of 4th degree   (24)

       Number of licences   (25)

       1st licencing agency   (26)

       2nd licencing agency   (27)

D. Patterns of Employment

Career Data

	Current	longest in past 12 months	at 30	at 40	first
Employed	28	35	–	–	–
Job at	–	–	42	49	56
Municipality	29	36	43	50	57
Industry	30	37	44	51	58
Occupation	31	38	45	52	59
Starting Age	32	39	46	53	60
Job Duration	33	40	47	54	61
Class of Worker	34	41	48	55	62

E. Recent Employment Activity

Weeks working full time   (63)

Weeks working part-time   (64)

Weeks looking for work   (65)

Total weeks working looking   (66)

Weeks going to school   (67)

Weeks keeping house   (68)

Weeks retired   (69)

Weeks other   (70)

Other type of activity   (71)

Total non-labour force weeks   (72)

F. Income

Wages and salary   (73)

Wages and salary year code   (74)

Self-employed income   (75)

Self-employed income year code   (76)

Self-employed income net change (77)

3.3 Collapsing Variables

For the general analysis certain variables must be collapsed.
Degrees should be in four groups based on last or highest degree earned.
First, B.A., B.Sc. or equivalent; second, M.A. or equivalent; third, Ph.D.
or equivalent; and fourth M.D. or equivalent (for details see below, Chapter 5
on Cohort Analysis).

A most difficult problem in the analysis of the survey data will be
the matching of education with career continuity. For the assessment of the
match between education and employment at the general level we suggest the
following grouping of variables.

List 3.3   Educational and Occupational Groups

Educational Field

Based on field for last or highest degree. Numbers correspond to field list in Section II, List II, of HQMS questionnaire.(Appendix D).

1. Mathematics (90, 92-93)

2. Engineering and applied sciences (58-73)

3. Agriculture and biological sciences (49-57)

4. Physical, earth, marine and space sciences (85-89, 91, 94-98)

5. Health specializations (74-84)

6. Management, administration and commerce, including public administration, etc. (25, 26, 30-33, 44)

7. Social sciences and related (25-36, 38-43, 46-48)

8. Education teaching fields (I-II)

9. Fine and applied arts (12-14)

Occupational Field

Based on current or last occupation. Numbers correspond to "Canadian Classification of Occupations" four digit code.

1. Occupations in mathematics etc. (2181-2189)

2. Architects and engineers (2141-2169)

3. Occupations in life sciences (2131-2139)

4. Occupations in physical sciences (2111 and 1131) (2111-2139)

5. Occupations in medicine and health (3111-3159 and 1134)

6. Managerial, administrative and related occupations (1111-1179)(1111-1130, 1135-1179)

7. Occupations in social sciences and fields (23-1-2339, 2391-2399 and 1132)

8. Teaching and related occupations (2731-2799) and 1133)

9. Artistic, literary, recreational and related occupations (3311-3379)

10. Humanities, including library science (15-24)

10. Occupations in humanities, university teaching (2350-2359), library science (2711-2719)

11. Secretarial science (45)

11. Clerical and related occupations (4110-4199)

12. Law (37)

12. Law and Jurisprudence (2341-2349)

13. Sales occupations (5130-5199)

14. Service occupations (6111-6199)

15. Farming, horticultural, etc. (7112-7199)

16. Fishing, hunting, etc. (7311-7319)

17. Mining and quarrying, etc. (7710-7719)

18. Processing occupations (8110-8299

19. Machining, etc. (8310-8399)

20. Fabricating, etc. (8510-8599)

21. Construction trades (8710-8799)

22. Transport Equipment (9110-9119)

23. Materials handling (9310-9319)

24. Other crafts (9510-9599)

25. Occupation N.E.C. (9910-9926)

Columns do not necessarily have to coincide in order for education and employment to be "matched". For example, humanities can be related to teaching, literary occupations, etc. (The blatant mismatches which show up should be noted.) Occupational groups 13-25 are those in which highly qualified manpower is unlikely to be found. They could possibly be collapsed.

Obviously administrators in social sciences pose special problems, and university teachers who come from a variety of fields. These are occupationally classified here as an occupation in the humanities (No. 10).

3.4 Record Linkage with 1971 Census

In our opinion, for the purposes of the General Review, it would not be useful to report linkages with the 1971 Census. However, we can identify a number of Census variables that would be most useful for subsequent reports involving record linkage. Among these variables are:

List 3.4 Census Variables for HQMS Linkage

Variable	Census Code	York/IBR File Code
Family size	F	FILC 008-017
Mother tongue	LANM	FILC 051-055
Birthplace	NATPL	FILE 018-037
Period of immigration	PERIMM	FILE 038-050
Citizenship	CIT	FILE 067-084
Ethnic group	ETH	FILE 085-114
Language spoken	LANUSU	FILE 143-160
Migration status	MIGF	FILG 018-053
No. bedrooms	CHAMB	FILJ 008-014
No. automobiles	AUTO	FILJ 036-039
Dwelling value	VALHAB	FILJ 048-149
No. Mortgages	HYPORT	FILJ 050-052
Rent	RENTLOY	FILJ 065-068

These could be used ultimately to examine some background variables especially language, birthplace and citizenship. Also data on home and automobiles might provide some crude indicators on current life style. These of course, are extraneous to the current purpose and are suggested only to create a more generally useful data set for studies of careers, mobility and the Canadian occupational structure.

Additional data could facilitate this analysis. Obviously important policy questions rest on the return on investment in post-secondary education. The data here can inform part of that question - that on return. Investment figures by degree programmes, fields and institutions could make this data far more useful.

3.5 Special Problems of Analysis

Both the general and specific analyses will be specified further below (Chapters 4 - 9). Before presenting these topics in greater detail, we point out some special problems in analyzing the HQM data.

Most serious of these is the fact that the 500 CCO. occupations and the 98 HQMS fields of study imply a matrix with 49,000 cells and little potential for simplifying statistical analysis. Recoding to employ something like the Pineo-Porter scale would be a Herculean task given the number of cases.

Such data can be simplified by collapsing categories which always carries the cost of information loss. This would be difficult because for any given career several others would lie in differing degrees of proximity. Thus, a standard "collapse" would be more or less irrelevant to some careers and fields of specialization. Since all this is overlaid with a potentially large number of cohorts, the analysis is further complicated.

Clearly, the only solution is to make as many reasonable combinations as possible. In this document we recommend certain selections and combinations of variables on the basis of our experience in analyzing data of this kind. Further reccommendations will be possible after initial data outputs are available for inspection.

There is a further approach to keeping the scope of the analyses within reasonable limits. That is the careful selection from both the general and the special analyses discussed in the outlines of Chapters 4 - 9. Such selections

may be made on two dimensions: between chapters or within chapters. We

provide further recommendations in this regard.

3.6 A Note on Data Formating

Tables should be clearly labelled with the independent variables

in the <u>columns</u> and dependent variables in the <u>rows.</u> Percentages should run

down columns, total 100% and include base N.[1] For the specification:

Dep. Var. by Ind. Var. by A - by B when more than one independent variable

is involved, the following format should be used:in addition to tables for

zero-order relations.

Independent Variable

	Ind. Var. B						Ind. Var. $\overline{B}$					
	Ind. Var. A			Ind. Var. $\overline{A}$			Ind. Var. A			Ind. Var. $\overline{A}$		
Ind. Var	1	2	3	1	2	3	1	2	3	1	2	3
Dependent Variable 1	%	%	%	%	%	%	%	%	%	%	%	%
2												
3												
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

N=

Partial measures of association including nonparametric statistics

are appropriate here.

Two further "dummy tables" are offered as illustrations on the

following pages.

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1. For sources on conventions for table presentation, see: James A. Davis
   and Ann Jacobs, "Tabular Presentation", in the <u>Encyclopaedia of the Social
   Sciences</u> (New York: Macmillan, 1968).

Dummy Table based on table specification 4.37

The tables will cover:
Provincial Distribution of Respondents by current occupation (grouped) and by Field (grouped) and by Degree (grouped).

The first example is:
Provincial Distribution of Respondents by current occupation (grouped) for those naming mathematics and related as field (No.1) holding a BA or equivalent as highest degree.

Occupation Groups

Province	1. Mathematics	2. Engineers	3. Life Sciences	4. Physical Sciences	5. Medical	6. Managerial Adm.	7. Social Sciences	8. Education	9. Arts	10. Humanities	11. Clerical	12. Law	13-25 Other	TOTAL
New Brunswick	%													
Newfoundland														
Nova Scotia														
Prince Edward Island														
Total Maritimes	%													
Quebec														
Ontario														
Alberta														
Manitoba														
Saskatchewan														
Total Prairies	%													
British Columbia														
Yukon, Northwest Territories														

TOTAL   N   100%   TOTAL

Note that there would be 48 tables in this set.

Each would cross break occupation on Province for each combination of the 12 field groups and the 4 degree levels.

Note however most cases would occur in the corresponding column (i.e. occ. group 1 in the field No.1 table.

Dummy Table based on table specification 6.3320

The tables will cover:
    For all Respondents 40 years of Age and over, current occupation by
    occupation at 40 by occupation at 30 by 1st occupation by field.

This example is:
    Current occupational group by occupational group at 30 for Respondents
    having first occupational group in humanities (No.10) and naming field
    as humanities (No.10).

    Humanities First Job and Humanities Field.

Occupation at 30

Current Occupation	1. Mathematics	2. Architects and Engineers	3. Life Sciences	4. Physical Sciences	5. Medicine and Health	6. Managerial	7. Social Sciences	8. Teaching	9. Artistic	10. Humanities	11. Clerical	12. Law	13-25 Other	TOTAL
1. Mathematics														
2. Architects and Engineers														
3. Life Sciences														
4. Physical Sciences														
5. Occupations														
6. Managerial														
7. Social Sciences														
8. Teaching														
9. Artistic														
10. Humanities														
11. Law														
12. Clerical														
13-25 Other														

TOTAL   N =

Note that the complete sequence of tables Implied in this specification would be 156.

Each would cross break occupation at 40 on current occupation by each combination of 1st job (13 categories) and field (12 categories).

Only the complete set of tables can permit analysis of career patterns and movements into and through occupations at the several career levels.

Most respondents would have stable careers (i.e. the greatest concentration for the above example would be in the cell defined by row 10 and column 10). But the other cells would show where respondents had "gone" career wise even though their early career was stable in the humanities.

CHAPTER 4

PROFILE OF HIGHLY QUALIFIED MANPOWER

This chapter presents a basic profile of HQM in Canada. As such, it serves as the foundation on which the subsequent analyses rest.

4.1 Basic Distributions

To obtain some idea of the general nature of the HQM supply, the analysis should run frequency distributions for almost all the variables in the study. The table that follows, (Table 4.1) includes these variables with some notes and suggestions for the first computer run. These figures can serve to inform subsequent analysis and to allow the intelligent collapsing of categories (see footnotes 1-7 in Table 4.1)

Also, the computer programmes used for the analysis of the data should, in keeping with our preceding recommendations on data formating be able to produce the data in easily readable table formats. Two such programmes are the Statistical Package for the Social Sciences (S.P.S.S.) and DATA TEXT. Most computing facilities have one of these or a comparable programme package available.

TABLE 4.1

VARIABLE LIST FOR HQM FREQUENCY DISTRIBUTION RUNS WITH NOTES ON CENTRAL TENDENCY AND DISPERSION

Variable* (respondents by)	Frequency Distribution	Numerical Distribution	% in Category	Central Tendency	Dispersion
1 Municipality	X	X	X		
2 Place (rural/urban)	X	X	X		
3 Province	X	X	X		
4 Sex	X	X	X		
5 Year of birth	X	X	X	X	X
6 No. of degrees	X	X	X	X	X
7 Highest degree held (or last)					
7.1 type	X	X	X		
7.2 field [3]	X	X	X		
7.3 year awarded	X	X	X		
7.4 university or country [4]	X	X	X		
8 Currently employed	X	X	X		
8.1 industry [5]	X	X	X		
8.2 occupation, current (or last) [6]	X	X	X		
8.3 municipality [1]	X	X	X		
8.4 starting age	X	X	X	X	X
8.5 class of worker	X	X	X		
8.6 job duration	X	X	X	X	X
9 1st job upon graduation	X	X	X		
9.1 industry [5]	X	X	X		
9.2 occupation [6]	X	X	X		
9.3 municipality [1]	X	X	X		
9.4 starting age	X	X	X	X	X
9.5 class of worker	X	X	X		
9.6 job duration	X	X	X	X	X
10 Job at 30 [7]	X	X	X		
11 Job at 40 [7]	X	X	X		
12 Activity					
12.1 weeks work full time	X	X	X	X	X
12.2 weeks working part time	X	X	X	X	X
12.3 weeks looking for work	X	X	X	X	X
12.4 labour force weeks (12.1+12.2)	X	X	X	X	X
12.5 weeks going to school	X	X	X	X	X
12.6 weeks keeping house	X	X	X	X	X
12.7 weeks retired	X	X	X	X	X
12.8 other weeks	X	X	X	X	X
13 Income					
13.1 Annual wages and salary	X	X	X	X	X
13.2 annual self employed income	X	X	X	X	X
13.3 net change in self employed income	X	X	X	X	X

Notes for Table 4.1

All variables should be shown by frequency distribution. Central
tendency should include, Mode, Median and Mean. Measures of dispersion include:
standard deviation, variance, range, inter-quantile range. Measures of Kurtosis
and Skewness are also appropriate.

1. 20 largest metropolitan areas in Canada central, suburban (see city list
    in the section on Mobility below, section 7.2)

2. Census definition by place size, suggest 5 levels (500,000 and over; 499,999-
    100,000; 99,999-30,000; 29,999-10,000; 9,999 and below)

3. Uncollapsed and collapsed (see field list in section 3.3)

4. List all Canadian universities and 10 largest degree granters outside of Canada.

5. Collapse standard industrial classification into the 12 divisions and the
    30 major groups. (i.e., eliminate 3 digit individual number classification).

6. Collapse CCO classification to both 19 areas and 83 sub areas for this analysis.

7. Retain for cohort analysis (Section 5 below) although it is useful   to
    distribute as above in variables numbers 8 and 9.

*   Each marginal distribution could be compared to available census data for
    a comparable population; (i.e., the population from which the HQM sample was
    drawn).

These marginal distributions should be elaborated by an appropriate text. This text should take note of the relative representativeness of these distributions with information available on corresponding population dimensions (as in the discussion of external validity, Chapter 2). In particular, differentials along important dimensions should be noted. Among the most crucial are sex, province, municipality, place, occupation and employment.

It should also be noted that these basic marginal distributions could also be provided on a by-province basis. Thus provinces could be compared with one another, any given province could be compared with the average for or whole of Canada, and either the whole of Canada or any given province could be compared with census data.

4.2 First Order Cross-Tabulations

Following the analysis of distributions some preliminary cross-tabulations should be run, to further specify the nature of HQM supply. For all these cross tabulations, tables should be carefully constructed following standard format, with full and clear labelling. Appropriate statistics including measures of association should be computed. (Programmers and statisticians can easily select these).

The following should be noted regarding the ordering of variables. There are several variables which can be meaningfully ordered, but this should follow a preliminary analysis of the distributions. Some variables like degrees have an intrinsic ordering dimension (though does M.D. go after Ph.D.?). With some manipulations,even relatively complex levels can be ordered successfully. This must remain a task to be completed following the first reviews of data distributions.

We now set forward the specifications of a number of cross tabulation tables we would recommend.

Age and Sex Distributions

4.2   Age (grouped by 5 years oldest to youngest)

4.21 Last field by Age

4.22 Last degree by Age

4.23 Current*(or last) occupation by Age

4.3   Sex

4.31 Last field by sex

4.32 Last degree by sex

4.33 Current (or last) occupation by sex

These analyses will permit the examination of the distributions of fields of specialization, degrees and current occupational positions in the demographic structure of Canada, both by age and by sex. Sex and age differences are bound to be striking, and of policy importance.

Geographical Distributions

These tables are assigned to show the geographical distribution of HQM with several other variables that allow a close multi-variate interpretation.

4.4 ⋯   Provincial distributions

4.41 Province by field

4.42 Province by degree

4.43 Province by current occupation

4.44 Province by field by degree

4.45 Province by current (or last) occupation by field

4.46 Province by current (or last) occupation by degree

4.47 Province by current occupation by field by degree

* For each use of current occupation if respondent has none, last occupation should be substituted.

4.5   Distribution by Place (see footnote 2 of Table 4.1)

    4.51 Place by field

    4.52 Place by degree

    4.53 Place by current (or last) occupation

    4.54 Place by field by degree

    4.55 Place by current (or last) occupation by field

    4.56 Place by current (or last) occupation by degree

    4.57 Place by current (or last) occupation by field by degree

4.6

        Distribution by 20 selected cities

    4.61 City by field

    4.62 City by degree

    4.63 City by current (or last) occupation

    4.64 City by field by degree

    4.65 City by current (or last) occupation by field

    4.66 City by current (or last) occupation by degree

    4.67 City by current (or last) occupation by field by degree

These data will permit an examination of the regional distributions and cneters of concentration of specializations and degree levels and occupations. Three way tables (Nos. 4.44-4.46, 4.54-4.56, 4.64-4.66) will allow precise locations of manpower by field, degree and occupation, with useful comparisons.

Institutions as Suppliers

4.7   Institution granting last degree (largest degree granters in Canada and 10 largest outside; See ftn. 4, Table 4.1)

    4.71 Municipality by institution

    4.72 last degree by institution

    4.73 last field by institution

    4.74 current occupation by institution

4.75   field by degree by institution

4.76   current occupation by field by institution

4.77   current occupation by degree by institution

4.78   current occupation by degree by field by institution

Table 4.71 will show some crude figures on the geographical mobility of graduates. The next three (4.72-4.74) will reveal which institutions supply what kind of highly qualified manpower by degree, field of specialization and occupation. This is a crude indicator of educational output.

The last few tables (4.75-4.77) and especially the very last (4.78) may prove to have very small numbers of cases in the cells but would be useful in elaborating the general relationships revealed in the immediately previous tables.

CHAPTER 5

COHORT ANALYSIS

5.1 Introduction

In this chapter we begin to pursue both the general and more specialized analyses of HQM under several generally important manpower headings. Here groups based on period of entry into the highly qualified labour force are examined and compared.

One solid way to analyze the changes in the composition of the highly qualified Canadian labour force is to compare cohorts. Cohorts can be artificially formed by placing respondents in groups based in time. Two alternatives arise here. First, respondents could be grouped by age (below 20, 20-24, 25-29, 30-34, 35-39, 40-45 and so on) or by year of birth (before 1903, 1903-1907, 1908-1912, 1913-1917, 1918-1922, 1923-1927 and so on) in some fixed number of categories. A second approach could fix cohorts by degrees and date of the granting of that degree. For example, Ph.D.'s granted 1920-25, 1926-30, 1931-35,... etc., and M.D.'s 1920-1925 and so on.

This last approach seems more relevant to the study of highly qualified manpower. (Note that the age occupation levels used throughout the analysis reflects age specific cohorts.) The criteria for cohort formation does remain an open issue. However, cohorts could be formed by dividing respondents into degree groups. Appropriate degree groups for last degree would be:

1. Pass or general B.A., B.Sc., B.Comm.; Honours B.A., B.Sc., or B.Comm.: Other university degrees at the undergraduate level; (Code 1,2,3,5)

2. Master's degree; university certificate or diploma following a Bachelor degree; other postgraduate degrees; (Code 6,7,9)

3. Doctorate; Ph.D., D.Sc.: (Code 8)

4. Degree in medicine, dentistry or veterinary science; M.D., D.D.S., D.V.M.; (Code 4).

Each of these groups could be divided into cohorts based on the year in which the last degree was granted. Periods of 5 years might be suitable but fewer cohorts would be advisable to keep the groups large enough for analysis. We suggest the following be used:

Before   1925

1925-1935

1936-1944

1945-1950

1951-1955

1956-1960

1961-1965

1966-1970

1971-present

If the degree-date cohorts prove too small collapsing categories will be necessary. This can only be determined upon examining the distribution.

5.2 Analysis by Cohort

With a way of defining cohorts established, we can now suggest how this variable be used in relation to a number of other aspects of HQM. In particular, the following tables are recommended:

5.2   Cohort Tabulations

   5.21 Distribution of respondents by cohort

   5.22 Distribution of degrees by cohort (independent of degree)

   5.23 Distribution by cohorts (for each degree)

   5.24 Age by cohorts

   5.25 Sex by cohorts

   5.26 Fields by cohorts (for each degree)

5.27 Current (or last) occupation by cohort (for each degree)

5.28 Current (or last) occupation by cohort (for each degree) by field

5.29 Province by cohorts (for each degree; see Dummy Table 5.2, underleaf)

These data permit the examination of the variable composition of cohorts along the dimensions of sex, age, field, current occupation, and provincial distribution. In effect, cohort analysis is a powerful tool to study the changing composition of the highly qualified labour force. This composition will be reflected in the proportion of degrees across cohorts and the changing distribution of fields over cohorts. This analysis can be extended at any time.

Table 5: 2

Province by Cohort (for Ph.D.'s)

Ph.D. Cohorts

Province	Before 1925	1925 – 1935	1936 – 1943	1944 – 1950	1951 – 1955	1956 – 1960	1960 – 1965	1966 – 1970	1970 – present	TOTAL all Ph.D. Cohorts
Newfoundland										
Prince Edward Island										
Nova Scotia										
All Atlantic Provinces										
Quebec										
Ontario										
Manitoba										
Saskatchewan										
Alberta										
All Prairie Provinces										
British Columbia										
Yukon, Northwest Territories										

TOTAL CANADA   TOTAL

CAREER ANALYSIS

Special skills, degrees and occupational changes contribute to career patterns for each respondent. The analysis of these career patterns is one of the most challenging parts of the analysis of these data.

6.1 Fields and Degrees

The first phase of career analysis should examine the continuity of fields through degrees. Most respondents will not have four degrees, though many will have more than one. The tables specified in section 6.1 will show those who remained in a single field throughout their advanced training, and for those who did change fields between degrees the directions of these changes can be observed.

6.1   Fields and Degrees

    6.11   For those with 1 degree by degree

        6.111   Degree by field

    6.12   For those with 2 degrees

        6.121   1st degree by field

        6.122   2nd degree by field

        6.123   Field for 2nd degree by field for 1st degree

    6.13   For those with 3 degrees

        6.131   Degree by field for 1st degree

        6.132   Degree by field for 2nd degree

        6.133   Degree by field for 3rd degree

        6.134   Field for 2nd by field for 1st degree

6.135   Field for 3rd by field for 2nd degree

6.136   Field for 3rd by field for 1st degree

6.14   For those with 4 degrees

6.141   Degree by field for 1st degree

6.142   Degree by field for 2nd degree

6.143   Degree by field for 3rd degree

6.144   Degree by field for 4th degree

6.145   Field for 2nd by field for 1st degree

6.146   Field for 3rd by field for 2nd degree

6.147   Field for 3rd by field for 1st degree

6.148   Field for 4th by field for 1st degree

6.149   Field for 4th by field for 2nd degree

6.1410 Field for 4th by field for 3rd degree

More detailed analysis of the timing of shifts between fields and the elapsed time between degrees would be possible with these data but such tasks are of a lower priority.

6.2   Occupational Comparison

Essential to the understanding of highly qualified manpower is its movement through the occupational structure. Patterns of occupational mobility indicate the value of the occupational structure. The HQM survey provides invaluable data for tracing intra-career mobility among the highly qualified.

The following cross-tabulations are a beginning. There are other more complex analyses that can be done and there are, no doubt, those anxious to do them. The tables are divided into implicit cohorts based on the length of career as

defined by the number of age specific occupational responses.

6.2   Occupational comparison

   6.21   If under 30

      6.211   Current* occupation by 1st occupation

   6.22   If over 30 and under 40

      6.221   Occupation at 30 by 1st occupation

      6.222   Current occupation by 1st occupation

      6.223   Current occupation by occupation at 30

   6.23   If over 40

      6.231   Occupation at 30 by 1st occupation

      6.232   Occupation at 40 by 1st occupation at 30

      6.234   Current occupation by 1st occupation

      6.235   Current occupation by occupation at 30

      6.236   Current occupation by occupation at 40

*   If no current, substitute last job data

      These tables are paired comparisons of two occupations noted by respondents including all those for which the respondents replied (1st after graduation, at 30, at 40, current).

6.3   Occupational Mobility

      Paired comparisons yield insights into the nature of mobility but to get at the patterns of mobility and the occupational structure multi-variate analysis is necessary.

      Occupations, fields and degrees can be combined with some of the early material in this report. The field and occupational groupings presented in section 3 (Analysis) permit a general field by occupation matrix which will show general continuity of education and career along the diagonal and mismatches outside.

To analyze these the following tables are specified:

6.3 Career continuity and occupational mobility

    6.31 If under 30

        6.311 1st occupation by field

        6.312 Current occupation by field

        6.313 Current occupation by 1st occupation by field

    6.32 If over 30 and under 40

        6.321 1st occupation after graduation by field

        6.322 Occupation at 30 by field

        6.323 Occupation at 30 by 1st occupation

        6.324 Occupation at 30 by 1st occupation by field

        6.325 Current occupation by field

        6.326 Current occupation by 1st occupation

        6.327 Current occupation by occupation at 30

        6.328 Current occupation by occupation at 30 by field

        6.329 Current occupation by occupation at 30 by 1st occupation

          6.3210 Current occupation by occupation at 30 by 1st occupation

                by field

    6.33 If over 40

        6.331 1st occupation after graduation by field

        6.332 Occupation at 30 by field

        6.333 Occupation at 30 by 1st occupation

        6.334 Occupation at 30 by 1st occupation by field

        6.335 Occupation at 40 by field

        6.336 Occupation at 40 by 1st occupation

        6.337 Occupation at 40 by occupation at 30

        6.338 Occupation at 40 by occupation at 30 by field

6.339. Occupation at 40 by occupation at 30 by 1st occupation

6.3310 Occupation at 40 by occupation at 30 by 1st occupation by field

6.3311 Current occupation by field

6.3312 Current occupation by 1st occupation

6.3313 Current occupation by occupation at 30

6.3314 Current occupation by occupation at 40

6.3315 Current occupation by occupation at 40 by occupation at 30

6.3316 Current occupation by occupation at 40 by 1st occupation

6.3317 Current occupation by occupation at 40 by 1st occupation by field

6.3318 Current occupation by occupation at 30 by 1st occupation

6.3319 Current occupation by occupation at 30 by field

6.3320 Current occupation by occupation at 40 by occupation at 30 by 1st occupation by field

With 33 tables specified, we have not controlled for degrees nor have we compared the synthetic cohorts noted in Section G. But 6.3320 will show all career patterns among occupations though still at an aggregated level of occupation and field.

6.4 Special Occupational Analysis

Even with this multitude of tables much remains unknown, precisely because of the great loss of information due to collapsing categories. To overcome this, special career analyses might be undertaken. For example, people in selected occupational categories could be analyzed to identify typical or modal career patterns. That is — How did these people come to these occupations?

A list of such occupations that could be analyzed follows:

List 6.4 List of Current Occupations for Special Analysis

Occupation	Code
Management occupations in the natural sciences and engineering	1131
Management occupations in the social sciences	1132
Administration in teaching and related areas	1133
Administration in medicine and health	1134
Finance management occupations	1135
Production management	1143
Chemists	2111
Physicists	2113
Biologists	2133
Architects	2141
Chemical engineers	2142
Civil engineers	2143
Electrical engineers	2144
Industrial engineers	2145
Mechanical engineers	2147
Metallurgical, mining, petroleum engineers	2151-2154
Mathematicians	2181
Systems analysts	2183
Economists	2311
Sociologists	2313
Psychologists	2315
Social workers	2331-2339
Law	2341-2349
University teachers	2711
Elementary teachers	2731
Secondary teachers	2735

List 6.4 (continued)

Physicians and surgeons	3111
Nursing	3130-3139
Artists	3311-3315
Secretarial	4110-4113
Clerical	4130-4139

For <u>each</u> of these specific occupational groups analysts should generate:

6.41 Distributions on specific occupations

  6.411 Specific occupation by field

  6.412 Specific occupation by 1st occupation

  6.413 Specific occupation by occupation at 30

  6.414 Specific occupation by occupation at 40

then using the implied cohorts analyze career patterns specific to each of these

current occupations:

6.42 Analyze specific occupations if over 40

  6.421 Specific occupation at 40 by occupation at 30

  6.422 Specific occupation at 40 by 1st occupation

  6.423 Specific occupation at 40 by field

  6.424 Specific occupation at 40 by occupation at 30 by field

  6.425 Specific occupation at 40 by occupation at 30 by 1st occupation

  6.426 Specific occupation at 40 by occupation at 30 by 1st occupation by field

6.43 If under 40 but over 30 analyze specific occupation

  6.431 Specific occupation at 30 by 1st occupation

  6.432 Specific occupation at 30 by field

  6.433 Specific occupation at 30 by 1st occupation by field

6.44 If under 30, for specific occupation

    6.441 Distribution on first occupation

    6.442 Disbribution on field

    6.442 Distribution on first occupation by field

    Again degrees have bben omitted. This variable could be easily added to the foregoing creating another dimension in the analysis.

6.5 Special Field Analysis

    Similarly groups of trained specialists couid be analyzed to determine what career patterns these specialists followed. That is - <u>Where did the specialists go?</u> We recommend analysis of the following specialists:

List 6.5 List of Special Fields for Analysis

01	Elementary school
05	Secondary school
10	Unspecialized education
16	History
21	Philosophy
23	Translation
30-33	Business administration, accounting and commerce
34	Criminology
35	Economics
37	Law
39	Environmental studies/planning
42	Psychology
44	Public administration
46	Social work
47	Sociology

49	Agriculture
51	Biology
58	Aeronautical engineering
60	Architecture
63	Chemical engineering
64	Civil
65	Electrical engineering
69	Mechanical engineering
70-72	Mining, metallurgical and petroleum engineering
75	Medicine basic
76	Medicine GP
77-79	Medicine specialized
80	Nursing
82	Public health and hygiene
86-89	Chemistry (compare to 63)
90	Computer science
93	Mathematics
97	Physics

For all these specializations there should be tables including:

    6.51 Current occupational distributions for each field of specialization

        6.511 Distribution of current occupation

        6.512 Distribution of 1st occupation

        6.513 Distribution of occupation at 30

        6.514 Distribution of occupation at 40

Then careers of specialists could be examined:

    6.52 Careers of specialists

        6.521 Current occupation by occupation at 40

        6.522 Current occupation by occupation at 30

        6.523 Current occupation by 1st occupation

        6.524 Current occupation by occupation at 40 by occupation at 30

        6.525 Current occupation by occupation at 40 by occupation at 30

              by 1st occupation

Finally, for these same fields, a synthetic cohort analysis could be conducted:

    6.53 Current occupation by cohort for each special field

6.6 Further Career Analysis

The potential for complex analysis of these data is overwhelming. Here we suggest a few further possibilities.

A more specific estimation of the match between education and employment might be undertaken. Perhaps on the basis of the results of the above as to which groups of respondents seem to be particularly well-fitted

or ill-fitted to the labour market, some particular degree-field combinations could be selected (e.g. Ph.D.'s in chemistry, M.A.'s in psychology, Ph.D.'s in sociology, B.A.'s in economics, etc.) and comparisons made among respondents as to the differences between current or last job and first job after graduation controlling for cohort of graduation and for sex.

By selecting a group of respondents whose training is the same except in one respect (e.g. M.A.'s in chemistry vs Ph.D.'s in chemistry in same cohort; Ph.D.'s in chemistry 1940-50 vs Ph.D.'s in chemistry 1960-70; male Ph.D.'s in psychology vs female Ph.D.'s in psychology; theoretical vs practical training in same field) one could assess the degree to which these "small" differences were of consequence. Using a regression model for all respondents with an M.A. or Ph.D. in physics, one could assess their employment patterns and try to deduce the power of cohort of graduation.

On the basis of whatever deductions can be made from the above, some individuals can be selected who might be illustrative of a particular phenomenon or trend and their educational and employment histories described. By plotting both modal and negative cases the flavor and detail of these career patterns could be more fully comprehended.

Still other career analyses could be undertaken. Analysis by Industries (See SIC classification) or age of first job might also yield useful results. But these seem to reach beyond the task at hand.

CHAPTER 7

MOBILITY

Modern industrial societies have extremely mobile, highly
qualified labour forces. Highly qualified men and women change both jobs
and places of residence frequently.

In this chapter we suggest ways to examine the geographical mobility
of the respondents. The occupational mobility is examined in the preceding
chapter on career analysis and the following chapter on employment analysis.
Here we examine job duration and the movement of HQM among provinces and
selected municipalities.

7.1 Job Duration

Before turning to the central aspects of mobility, we should examine
a simple direct measure of occupational change which may serve as an indicator
of disposition to move occupationally if not geographically. In fact, it
can be seen as the temporal measurement of occupational mobility. Job
duration is the indicator. This measure bears directly on both the preceding
and the following chapters and could easily be included in either.

First, the average job duration for all respondents should be computed
for all jobs except current job. That should be computed separately.

7.11   Average job duration and variation

        7.111 Mean duration for all jobs (except current job) for all
              respondents plus measures of dispersion, kurtosis, skewness

        7.112 Mean duration for current job plus measures of disperson,
              kurtosis, skewness

7.12 Job duration by standard variables (including average for each level of the named variable and measures of association, either correlations or nonparametric measures).

7.121 Job duration by sex

7.122 Job duration by age

7.123 Job duration by cohort (collapse degrees)

7.124 Job duration by degree

7.125 Job duration by field

7.126 Job duration by province

7.13 Job duration by occupation. Over all respondents for each occupation (grouped and ungrouped) should be calculated. This can be done by computations of a weighted average of matched occupation and job duration reports. This entails variable 33 by 31 plus variable 40 by 38 plus variable 47 by 45 plus variable 54 by 52 plus variable 61 by 50 which is mean job duration for all occupations at all levels (1st, 30, 40, current and last) or simply mean job duration by occupation. This can be distributed to yield a table of average job durations by occupation (7.131), which could be used to create a scale of temporally stable occupations.

7.2 Selecting Areas for Analysis of Mobility

Geographical Mobility is problematic because as can be seen throughout this analysis there are a variety of levels to the variable "place". Rural-urban differences are important but are inadequate as an exclusive basis of differentiation. Further, inter-provincial mobility is important politically. Regional differences are an integral part of Canadian life that cannot be ignored by policy makers.

For regional analysis the following groupings are suggested. (These should be used in any analysis, including the variable "province" as well.

New Brunswick

Newfoundland

Nova Scotia

Prince Edward Island

All Atlantic Provinces

Quebec

Ontario

Alberta

Manitoba

Saskatchewan

All Prairie Provinces

British Columbia

Yukon, Northwest Territories

Total

In addition, key cities are central to Canadian life. Some of these should be.included in mobility analysis. The selection of municipalities for analysis can be arduous. The selection is noted in Appendix F. Here we note those selected. This list should be appropriate to MSST needs, but is subject to addition and deletion.

Finally, we settle on the following list of Metropolitan areas.

Calgary, Alberta   Regina, Saskatchewan

Charlottetown, P.E.I.   Saskatoon, Saskatchewan

Edmonton, Alberta   Saint John, New Brunswick

Halifax, Nova Scotia   St. Catharines-Niagara, Ontario

Hamilton, Ontario   St. John's, Newfoundland

Kitchener, Ontario	Toronto, Ontario
London, Ontario	Vancouver, British Columbia
Montreal, Quebec	Victoria, British Columbia
Ottawa-Hull, Ontario-Quebec	Windsor, Ontario
Quebec, Quebec	Winnipeg, Manitoba

(For a listing of areas included in these CMAs, see Table 8 in Statistics Canada Publication 92-708).

In the tables that follow, the term "place" is used to refer to both province and this CMA list, hence the two should be substituted for two sets of tables for each specification. This should not be confused with place as used in Table 4.1 though this could be a third substitution if so desired.

7.3 Mobility

In analyzing mobility, first, the "immobile" ought to be eliminated.

All respondents listing only one municipality over all jobs (currents, at 40, at 30, 1st) should be designated "immobile" and distributed on geographic areas.

7.31   Distribution of immobile

    7.311   Immobile by place

    7.312   Province by immobile

    7.313   Municipality by mobile

A frequency distribution over both the provincial and municipality variable lists would reveal "who stays put" at two levels of geographical aggregation.

Next we can examine which people (by degrees, field and occupation) didn't move.

7.32   Immobility by selected variables

    7.321   Occupation by immobility

    7.322   Field by immobility

    7.323   Degree by immobility

Next the actual course of geographical mobility can be traced by limiting this analysis to those who have moved (the immobile having been removed, in the above section). Depending on length of career and number of moves, the remaining population can be separated into groups having moved once between any two positions (among 1st, 30, 40, current), twice, or three times. Note that this mobility will be a direct function of length of career, but it seems efficient to collapse the categories to number of moves and not control for length of career. Not collapsing, however, would be more sound for analytic purposes.

Here we suggest the following tables:

7.33   Mobility among places

    7.330   Number of moves (to 3) by length of career (1 to 4 measures of occupation – place)

    7.331   For those having moved once

    7.3311 2nd place by 1st place

    7.332   For those having moved twice

    7.3321 3rd place by 2nd place

    7.3322 2nd place by 1st place

    7.333   For those having moved 3 times

    7.3331 4th place by 3rd place

    7.3333 3rd place by 2nd place

    7.3334 2nd place by 1st place

    7.3335 4th by 3rd by 2nd by 1st place

This will permit a detailed analysis of moves among specific places – provinces and twenty municipalities.

Having covered the **locations**   let us turn to some characteristics of the mobile.

7.34   Characteristics of the mobile

7.341   Number of moves by occupation

7.342   Number of moves by 1st occupation

7.343   Number of moves by occupation at 30

7.344   Number of moves by occupation at 40

7.345   Number of moves by present occupation

7.346   Number of moves by field

7.347   Number of moves by degrees

7.348   Number of moves by field by degree

7.349   Number of moves by cohort

(Other relevant data can be found in the geographical distribution sections, 4.3 and 4.4.)

Once again we will have a comparative profile of those who were mobile in their careers.

EMPLOYMENT ANALYSIS

8.1 Employment Activity Profile

Central to the understanding of the nature of the highly qualified manpower supply in Canada is the analysis of employment activities. Initially, by distributing the employment variables (Numbers 63 to 72 in the HQM variable list) on selected independent variables such as age, sex, region, degree field and occupation, areas of underemployment concentration can be identified.

There are five major areas to be analyzed for assessing levels of employment activity. These marginal distributions yield a profile of those working full time, working part time, looking for work and keeping house.

The following employment activity tables are suggested:

8.11   Weeks respondents spent working full time **by each of the following:**

    8.111   Age

    8.112   Sex

    8.113   Province

    8.114   Municipality

    8.115   Last degree

    8.116   Last field

    8.117   Current occupation

    8.118   Occupation at 30

    8.119   Occupation at 40

    8.1110   First occupation after graduation

8.12 Weeks respondents spent working part time* by each of the following:

       8.121   Age

       8.122   Sex

       8.123   Province

       8.124   Municipality

       8.125   Last degree

       8.126   Last field

       8.127   Current occupation

       8.128   Occupation at 30

       8.129   Occupation at 40

       8.1210 First occupation after graduation

8.13 Weeks looking for work by each of the following:

       8.131   Age

       8.132   Sex

       8.133   Province

       8.134   Municipality

       8.135   Last degree

       8.136   Last field

       8.137   Current occupation

       8.138   Occupation at 30

       8.139   Occupation at 40

       8.1310 First occupation after graduation

8.14 Weeks respondents spent keeping house by each of the following:

       8.141   Age

       8.142   Sex

       8.143   Province

---

* Tables can be compared to create new tables of interest. For example, Table 8.13 can be compared with 8.23 and with 8.33 or 8.17 with 8.27 with 8.37, etc.

8.144 Municipality

8.145 Last degree

8.146 Last field

8.147 Current occupation

8.148 Occupation at 30

8.149 Occupation at 40

8.1410 First occupation after graduation

8.15 Weeks respondents spent going to school by each of the following:

8.151 Age

8.152 Sex

8.153 Province

8.154 Municipality

8.155 Last degree

8.156 Last field

8.157 Current occupation

8.158 Occupation at 30

8.159 Occupation at 40

8.1510 First occupation after graduation

These tables constitute a set made up of five dependent variables
and ten independent variables. These tables can inform questions about what levels
(degrees), kinds (fields) and specialties (occupation: current, 30, 40,
first after graduation) of the highly qualified labour force seem to be under-
utilized (working part time, looking for work, keeping house and possibly
going to school) and where these patterns occur (province and municipality)
and for what groups these problems are important (age and sex). The full
utilization of HQM will be shown (Table Set 8.11). The factors association
with this full employment will be revealed in the distribution of the
independent variables.

8.2 Employment Patterns

The marginal distribution will show both a lot and a very little. Key variables about causes or reasons for under utilization are not available in this survey. Keeping house, for example, may be a source of satisfaction or disappointment.

Any analysis of employment patterns must rest on a knowledge of the preceding profile. Here we attempt to suggest a few other approaches to the analysis of employment in the highly qualified labour force.

Looking for work could be collapsed into categories such as 1 - 2 weeks, 3 - 4 weeks, 4 - 6 weeks, 7 - 10 weeks, more than 2 months, more than 3 months, more than 4 months, etc.

This could then be used as a dependent variable in some simple multivariate tables.

8.21 Analysis of work seekers

8.211   Looking for work (grouped) by degree by field

8.212   Looking for work by age cohort by degree

8.213   Looking for work by age cohort by field

8.214   Looking for work by last occupation by field

8.215   Looking for work by last occupation by degree

8.216   Looking for work by field by province

8.217   Looking for work by field by municipality

8.218   Looking for work by degree by province

8.219   Looking for work by degree by municipality.

Here we can see who sought employment, what their qualifications were (degree and field) what they did last (occupation) and where they sought jobs (province, municipality).

Women and housekeepers are two sets which are unfortunately too

coterminus and which need to be analyzed. Table specification 8.142 will be a starting point to examine the overlap. But the under-utilization of women is a crucial fact in the examination of highly qualified manpower.

If the number of male housekeepers is very small, that group can be eliminated in what follows, and if not, it can be retained. We suggest the following tables, collapsing housekeeping weeks into 5 groups of 1 - 10 weeks, 11 - 20 weeks, 21 - 30 weeks, 31 - 40 and 41 - 52 weeks.

8.221	Housekeeping (collapsed)	by sex
8.222	"	by current (or last) occupation
8.223	"	by degree
8.224	"	by field
8.225	"	by degree by field
8.226	"	by field by province
8.227	"	by degree by province
8.228	"	by field by municipality
8.229	"	by degree by municipality

Simplistically, school attendance can be either elaboration of skills or seeking higher credentials to increase employment success likelihoods. The unemployed educated often "go back to school" when they are unable to find a satisfactory job. Given this and other confounding factors, we suggest no detailed analysis of school attendance.

The areas of concentrated under-utilization of HQM should become the focus of more specialized analyses. Certain fields and degrees may be associated with high employment stability, others may not. It may even be possible to construct a scale of occupations and specializations based on the level of under-utilization. Such procedures are complex and will not be elaborated here.

These should be examined closely, but here (again) even more than in other areas of analysis, the nature of the data must inform specialized

29855
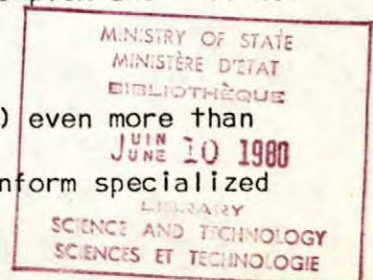
analyses. That historians are more often unemployed than economists

would indicate a need for comparing backgrounds, degrees and locations

of these groups. Here we can only urge these more specialized studies

until more data are available.

INCOME

Introduction

Practically and politically, income differentials are important, though not easily adjusted through policies. Here we propose to generate income distributions and statistics based on a standard set of variables used in other analyses. The total result will be a matrix of tables using three income-dependent variables and the 10 independent variables (11, if cohort is counted apart from age).

9.1 Annual Wages and Salary Distributions

9.11 Annual wages and salary distributions by age

9.12   sex

9.13   province

9.14   municipalities

9.15   last degree

9.16   last field

9.17   current occupation

9.18   occupation at 30

9.19   occupation at 40

9.110   first occupation after graduation

9.2 Annual self-employed income distributions

9.21 Annual self-employed income distributions by age

9.22   sex

9.23   province

9.24 Annual self-employed income distributions by municipalities

9.25   last degree

9.26   last field

9.27   current occupation

9.28   occupation at 30

9.29   occupation at 40

9.210   first occupation after
                                                                    graduation

9.3 Annual Total Income Distributions

9.31 Annual total income distributions by age (also by cohort)

9.32   sex

9.33   province

9.34   municipality

9.35   last degree

9.36   last field

9.37   current occupation

9.38   occupation at 30

9.39   occupation at 40

9.310   first occupation after
                                                                    graduation

The differentials according to sex, province, municipality, degree and field will be worthy observations, but not particularly relevant to policies except those concerned with redistribution.

Given costs of data analysis and priorities, this may be an area where analysis could be kept to a minimum.

CONCLUSION

In this report we have attempted to set forth the procedures
for a preliminary analysis of HQMS data, in which we seek to maximize
1) the general interpretation of the patterns, processes and anomolies
of highly qualified manpower in the Canadian occupational structure
and 2) the potential for detailed follow-up analyses of special fields,
occupations and career patterns. Throughout we have tried to concentrate
on the variables of central significance.

The detailed nature of the data and the size of the sample
will make the thorough analysis of the HQMS expensive. But these are
extremely valuable data that can, when carefully analyzed, inform policy
makers about significant trends in the highly qualified labour force.
In particular, educational investments can be more adequately determined.
In addition, there are a host of important questions about manpower and
Canada that can be answered to the satisfaction of both government officials
and social scientists.

Paradoxically, the hundreds of tables called for here constitute
a rather exhaustive, but preliminary analysis of these data. The Ministry
of State for Science and Technology should review these specifications
and attempt to establish a set of priorities for analysis. Some of the
areas of analysis proposed here may not be central issues for MSST and
MSST may have questions not covered here. Because we lack a full know-
ledge of the constraints of costs, time and policy matters, we have tried
to pose answers to generally important questions. The task now for both
MSST and the data analysts is to more precisely specify what is to be done.

APPENDIX A

BASIC RATIONALE FOR HIGHLY QUALIFIED

MANPOWER POST CENSAL SURVEY

Basic Rationale
for Highly Qualified Manpower Post Censal Survey

The main reasons for special concern with highly qualified manpower are: first, that it is a relatively important segment of the labour force which makes a proportionally larger contribution to GNP, and which is increasing rapidly as a proportion of the labour force.

Secondly, it is evident that highly qualified manpower performs a special role in economic growth even though the nature and process of its contribution are not fully understood. In addition to being a relatively more valuable economic resource, it also performs the role of improving the socio-economic value of all human resources. Health manpower for example carries this role by increasing the length of active working lives and by reducing the incidence of sickness and disability; and in the education industry, including universities, by increasing human capital resources. Some groups included in highly qualified manpower perform a direct role in the generation of economic growth in a modern technological society by their activities in discovering new knowledge and adapting it for productive purposes. All highly qualified man-power contributes directly to the management of the economy; and particularly to the management of technology. It is also responsible for the management of all other kinds of manpower.

Thirdly, highly qualified manpower merits special attention because it is a relatively more valuable economic resource. Given the relatively greater investment in its education, the social and economic benefits of this kind of manpower being well allocated and utilized, are greater than for other types. Imbalances in the labour market for highly qualified manpower are costly and capable of quickly becoming serious, particularly since the development process for highly qualified manpower is much longer than for any other segment of the labour force. Consequently, adjustment of supply (except by way of changes in immigration) requires years to manifest itself.

The need for better educational and manpower planning is well appreciated in many quarters[1] including the provincial[2]. It hinges on developing the ability to make reasonably good predictions of both supply and demand of highly qualified manpower for a number of years ahead. The federal government role in this matter is acknowledged to be critical and its more active pursuit a matter of some urgency.

One aspect of the situation is the relative scarcity of information concerning the development and utilization of highly qualified manpower. Conspicuously inadequate also is the body of knowledge of the working of the education-employment system complex, required to embark on an indicative form of long-term manpower and educational planning. The HQM Post-Censal survey is intended to provide significant contribution in both these areas.

The survey will provide the most comprehensive complement of data available to date concerning the size and various demographic, educational, occupational, and employment status characteristics of the HQM supply in Canada. These, by design, are to provide links between education and employment, serve the needs of HQM forecasting and thus contribute to educational and manpower planning.

One of the capabilities of the Post-censal Survey is that it provides links between education and employment. One set of its data for example will yield occupational patterns for HQM and employment/unemployment status for the Fall of '73. This should permit estimates of unemployment by educational specialty; it should indicate which occupations should be more closely monitored in demand surveys and should also provide some appreciation of the extent to which persons with particular qualifications are taking jobs below their skill level. Another set of data from the Post-censal Survey pertains to the work history aspects of the utilization of HQM and permits investigation, not only of occupational matrices for HQM but of career patterns and profiles as related to age, sex, educational level and specialty, etc., and of occupational and geographical mobility of this element of the Canadian labour force. These are but a few examples of the expected use of the survey data in the context of demand for education.

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1. Economic Council of Canada, _Design for Decision Making_, Eighth Annual Review, September 1971.

2. Report of the Commission on Post Secondary Education in Ontario, _The Learning Society_, December 1972, Chapter 6, Recommendation 85.

With reference to the Survey's capability to serve the needs of manpower forecasting that is required to provide future-oriented scenarios to educational and manpower planning it should be pointed out that in many respects its data output constitute an essential complement to those obtained in the demand surveys.

The Occupational Employment Survey (OES) planned by Statistics Canada and the Department of Manpower and Immigration in cooperation with this Ministry, is now underway. It will provide occupational distribution of total employment (excluding self-employment) on a current basis and probably every two years and thus serve the needs of employment projections.

Such estimates of manpower "demand" cannot however be used in a direct fashion to derive supply requirements in terms operationally meaningful within the supply complex for HQM. The OES will produce an occupational distribution for all employees including, but not identifying, those with university degrees or equivalent qualifications. There are instances of jobs which are educationally specific, i.e. engineers, physicians, etc., but even then the inference pertains to a minimum entry requirement. Most frequently the demand for various "skills" usually acquired through higher education and related employment experience is spread over many educational categories. The only recent and certainly most comprehensive data for relating and "matching" "demand" and "supply" for manpower will be provided by the HQM Post-censal survey; this is by constructing education/occupation converter matrices based on education/employment experience of the respondents indicated in the results of the survey.

Better manpower and educational planning depends on the development of the capability to make reasonably good predictions of both demand for and supply of manpower for a number of years ahead, particularly in the case of HQM. The continuation of OES will improve that capacity on the demand side. As for HQM supply, it is important to point out that the estimates from the Post-censal Survey may be kept reasonably current by updating, using information on graduates by educational specialty and adjusting for attrition (death, retirement) and immigration. There will, of course, be problems but the fact that we will have, for the first time, a base year HQM population by educational specialty, will by itself be a great step toward better forecasting of manpower supply.

APPENDIX B

HIGHLY QUALIFIED MANPOWER

SURVEY METHODOLOGY

OBJECTIVE

The objective of the Highly Qualified Manpower Survey (HQMS) is
to supplement 1971 Census data on university graduates in Canada
with additional information on their types of degree, their fields
of study, their occupations, and their career profiles. This
extra information is to be combined with existing data to allow
an assessment of the impact of past expenditures for education in
this country on the presently utilized manpower supply. This data
will also assist in the formulation of policy relating to long-
range planning in the fields of education and manpower planning.

OUTLINE OF METHODOLOGY

The methodology of the survey consists of the following main steps:

1) Creation of the HQMS population file by extracting from the
   1971 Census sample file all those persons reporting a university
   degree.

2) Selection of a sample of these persons.

3) Manual identification of selected persons in Census returns and
   the recording of names and addresses.

4) Mail-out and follow-up operations carried out in Regional Offices.

5) Head Office coding, transcription and data capture.

6) Computer processing - editing, weighting and tabulation.

7) Dissemination of Results.

CREATION OF THE HQMS POPULATION FILE

The population of interest consists of all persons with a university
degree who were permanent residents in Canada on Census day (June 1st)
1971. Persons joining the degree-holding population (i.e. recent first
graduates and graduate immigrants) between June 1st, 1971 and the HQMS
date (September 1973) are not included in the population.

In the 1971 Population Census of Canada a one in three random sample of
households was selected. Each person in each selected household was
required to answer additional questions covering, amongst other topics,
years of university education, highest university degree, certificate
or diploma awarded (see appendix 1), labour force status, and occupation.

A Census sample file was created containing all the Census data for all
households in the Census sample. Records on this file were edited for
validity and consistency and imputations were made for missing or
invalid fields. A weighting procedure was carried out that gave each
household and each person in the Census sample an integer weight to
be used for producing tabulations from the sample file. This weight
indicated the number of population members that each sample member
was to represent. On average this weight was equal to three since a
one in three sample had been selected originally. Subsequent tabulations
involving sample data were produced by summing the weights of all
sample members falling in each cell of the required tabulation. For
the purposes of weighting the country was divided into 'weighting areas'
each containing about 4,000 persons. At the weighting area level the
weighting procedures ensured that, if one produced certain basic
cross-tabulations involving 100% Census data but using only the
sample households, the resulting tabulation would agree (exactly
or almost exactly) with the corresponding tabulation produced by
making simple counts from the 100% Census population file (i.e. the
file containing basic data on all households).

The sampling frame used for selecting the HQMS sample consisted of
all persons who were coded on the Census sample file as having at
least a Bachelors degree as their highest academic qualification.
In some cases the code on the Census file may not agree with the
response on the Census questionnaire (e.g. due to processing error,
or inconsistency revealed during editing) which in turn may not
agree with the 'true value' for the person (e.g. due to respondent
or enumerator error in interpreting and answering the question).
Quality control procedures on Census processing were designed to
keep processing errors to a minimum, while attempts to minimize
response problems (including non-response) were made through
careful questionnaire design and intensive enumerator training.
Provided that no systematic error was introduced at any stage in
Census collection or processing, these non-sampling errors would
tend to cancel out and so would have only a small effect on Census
tabulations for large areas. However, at the individual person level
such errors present more of a problem. For example, given a certain
number of non-respondents to the Census degree question, the imputation
procedures might come very close to assigning degrees to the correct
number of these non-respondents in total and yet assign the wrong
degree status to a substantial proportion of individual non-respondents.
Furthermore, this sampling frame will clearly not contain any
university graduates who were missed in the Census. The exact
magnitude of the defects in the sampling frame caused by response
error or processing error in the Census will only become precisely
known as the HQMS is carried out. Indications of the extent of
the coverage error should come from the Census Evaluation programme.
Relative to the bulk of correctly coded persons on the Census sample
file, these problem cases should be infrequent.

In summary, the sampling frame for the HQMS is itself a random sample
of the population of interest. Due to non-sampling errors in the
Census it may contain some persons who do not have university degrees,
and may wrongly exclude some who do.

Each person coded as having a Bachelor degree or higher is extracted
from the main 1971 Census sample file and a new HQM Population (HQMP)
file is created with one record for each person in the HQM Population.

4. SAMPLE DESIGN and SAMPLE SELECTION

The HQMP file is stratified first by region then by level of degree
(Bachelor with 3 or less years of university education; Bachelor with
4 or more years; First professional degree; Master's or higher), then
by Labour Force status at Census time (in labour force; not in labour
force; inmate of an institution), and then by whether or not the
person worked in 1970 or 1971. Each stratum formed is further
subdivided either by broad occupation groups (for the worked in
1970 or 1971 strata) or by age-sex groups (for those strata in
which persons did not work in 1970 or 1971). Counts of the number
of persons in each sub-stratum are obtained and printed out.

Three types of sub-strata are identified:

(A) sub-strata from which it was decided to take all persons,

(B) sub-strata from which random samples were to be selected
     (in some cases these random samples turned out to be 100%
     samples as a result of sample size considerations).

(C) sub-strata from which no persons were to be selected (and
     which therefore were not part of the sampling frame).

Type A consists of all sub-strata containing persons with a Master's
degree or higher who were in the labour force at Census time. This
is the sub-group of the population that is of primary interest in
the survey. Type C consists of certain sub-strata which, although
in the population of interest as defined earlier, are not of interest
in terms of the stock of Highly Qualified Manpower available in the
future. Specifically Type C includes persons aged 70 or over on
Census day who were not in the labour force, and inmates of
institutions. All remaining sub-strata are of Type B.

The population sizes in each sub-stratum of Type B are examined
and, on the basis of the relative sizes and importance of the
various sub-strata, decisions are made as to which sub-strata
should be collapsed together to form final strata and what sampling
ratios should be used in each final stratum. For the determination
of sampling ratios, basic sampling ratios for the primary levels
of stratification (level of degree and labour force status) are
used as guidelines, and these basic ratios are varied by region
and by sub-stratum to give reasonable overall sample takes
(relative to the importance of the sub-stratum) in each final
stratum.

Having determined the final strata and the sampling ratios, six systematic samples of persons are selected without replacement from within each final stratum. For a stratum with sampling ratio f_h ($1/f_h$ was always an integer), the interval used is $6/f_h$.

An HQM sample file is created with one record for each person selected in the HQMS sample. As well as identification, Census data and Census weight, each record on the HQM sample file carries the stratum number and replicate number in which the person was selected together with a weight equal to the reciprocal of the person's probability of selection in HQMS.

5. NAME and ADDRESS CAPTURE and PREPARATION FOR MAIL-OUT

A print-out of the entire sample is obtained in Regional Office, Census Electoral District (ED) and Enumeration Area (EA) order. This print-out contains ED, EA, Household, and Person numbers to allow identification of the selected person in Census forms, and also some basic characteristics of the selected person which are to be used for matching purposes to confirm that the correct selected person has been identified. This is necessary because household and person numbers are not always 100% reliable. When a selected person has been found, his HQM identification number (generated at the time he was selected) his name, address, telephone number, and the name of the head of his household are all transcribed from the Census form onto a spreadsheet. Problem cases (e.g. missing Questionnaires, non-matching characteristics, incomplete addresses) are referred to special staff for resolution. Cases that could not be resolved are coded to a 'not found' category and of necessity are excluded from subsequent operations. Allowance is made for this category in the weighting procedures (see section 8).

Data on the spreadsheets are captured through a key to tape operation and are matched with the HQM Sample file to create a Name and Address file. From this file two complete sets of heat activated mailing labels are produced together with certain control listings of all sample members for use in Regional Offices and Head Office. Labels are produced in batches by language and Regional Office. The labels are attached to the appropriate face (English or French) of the questionnaire mechanically. The labelled questionnaire, an instruction booklet, a covering letter, and a return envelope are then stuffed into a window envelope using the facilities of DNR (Taxation). Two complete sets of mailing pieces are produced in this way. In the first set the covering letter is introductory, in the second set it is a reminder letter. All the mailing pieces are then shipped to Regional Offices.

6. MAIL-OUT AND FOLLOW-UP

The first set of questionnaires are mailed from Regional Offices. Each response received is edited manually for completeness. Edit failures are followed up immediately by telephone. When a questionnaire passes edit it is ready for transmittal to Head Office. Selected persons whose questionnaires are returned undelivered by

746-6361

70
11
30
14
125

the Post Office undergo a variety of tracing operations in an attempt to determine the present whereabouts of the person. If a person is found to have moved into another Regional Office's jurisdiction his case is transferred to the new Regional Office. Persons who are located during tracing are either interviewed by telephone or a questionnaire is mailed to them. Three weeks after the first mail-out the second (reminder) mailing piece is sent to all selected persons who have not responded and whose questionnaire has not been returned by the Post Office. After a further two weeks telephone reminder is begun in order to elicit responses from those selected persons who have still failed to reply. This operation generates more cases for the tracing operation which goes on continuously during this period. After a further three weeks (now eight weeks after the initial mail-out) all unresolved cases are identified and sampled for subsequent intensive follow-up. The data obtained from respondents in this sample follow-up phase is weighted up to be representative of all cases that were unresolved after eight weeks of the survey. In this way the danger of bias due to non-response or untraced persons is minimized. Sample follow-up also provides a budgetary safety valve since, based on expenditure up to that date, the sample follow-up rate can be raised or lowered so as to remain within budgetary constraints.

Completed questionnaires that have passed the edit are batched to undergo a quality control scheme to ensure that the edit is being correctly applied and, if accepted, are sent to Head Office. Certain other cases for whom there is not a completed questionnaire (e.g. person has died, refusal, etc.) are checked by supervisory staff to confirm that all necessary action has been taken and are then also sent to Head Office. Cases that were unresolved after eight weeks of the survey but which were not selected for sample follow-up are returned directly to Head Office in one batch.

Costs and progress in Regional Offices are monitored through a daily cost-progress reporting form that summarizes the hours spent, work completed, and any extra costs incurred each day.

7. HEAD OFFICE MANUAL PROCESSING

On receipt in Head Office each questionnaire is first assigned a status code. This code indicates both the final completion status of the questionnaire (i.e. completed questionnaire, person died or emigrated, refusal, blank questionnaire, etc.) and the sample follow-up status (i.e. sample follow-up not required, selected for sample follow-up, not selected for sample follow-up).

After status coding those questionnaires that contain no HQMS data (e.g. blanks, refusals, etc.) are separated from those containing HQMS data to be captured. The latter are grouped into batches of size approximately 100.

Each batch first passes through a manual edit and completion coding operation covering questions 3 - 6 on the questionnaire. In this operation all non-numeric entries for these questions are translated into numeric form and certain simple consistency checks are made. Problem cases arising from the education questions may be referred to a consultant. A quality control system is applied to this operation. It consists essentially of selecting a random sample of questionnaires from the batch and processing this sample again independently of their original processing in the main batch. Based on the comparison of the results of the two processing cycles for this sample a decision is made on whether to accept or reject the batch. Rejected batches are re-processed in their entirety.

Each batch then passes through Municipality, Industry, Occupation coding. This operation covers questions 1, 7, 8 and 9. Municipalities reported in question 1 or in part (ii) of question 7 are coded using the Census municipality coding scheme. Industry and occupation for each job reported are coded to the Standard Industry Classification and CCDO (Census version) using the responses to parts (i), (iii), (iv), (v) and (vi) of question 7. As with the previous operation, difficult cases may be referred and quality control procedures are applied.

When a batch has passed quality control of Municipality, Industry, Occupation coding it goes to the transcription operation. In this operation all required data is transcribed from the questionnaire onto specially designed spreadsheets. Because of the length of the questionnaire two spreadsheets are required for each person. Each spreadsheet corresponds to one sector of the questionnaire. The data transcribed includes an identification number, the status code, and all HQMS data. Quality control procedures are applied to this operation. Transcription of identification numbers and status codes is undertaken for those questionnaires containing no HQMS data.

Completed spreadsheets are then keyed to produce two magnetic tapes, one for each of the two spreadsheets, and each containing one record per person. The keying operation is subject to quality control.

8. COMPUTER PROCESSING

The first stage in computer processing is to match the keyed data with the corresponding record on the original HQM sample file. At this stage a check is carried out to ensure that (i) there is a keyed record for each person, and (ii) for those persons whose status code indicates that HQMS data is available, that the two keyed records have both been matched with the HQM sample file record. Also all fields are checked for valid data. Any mismatches, missing records, or invalid data are checked manually and suitable corrections are made. When all errors have been

successfully corrected the HQMS data file is ready to undergo the main edit and imputation procedures.

In the main edit and imputation procedures various checks on the internal consistency of each record are made and imputations are made to replace certain missing or invalid data items. In some cases where records fail consistency checks manual intervention and correction will be necessary, in other cases the necessary changes will be made automatically by computer. After the edit and imputation procedures have been completed the HQMS file contains only valid and consistent data and is ready for input into the weighting procedures.

At the time of sample selection each selected person was assigned an HQMS weight equal to the reciprocal of his probability of selection in HQMS. An initial weight for each person is calculated by multiplying his Census weight by his HQMS weight. The initial weight indicates the number of population members represented by the sample member. Various adjustments have to be made to this weight to allow for

(i)   non-response

(ii)   the sample follow-up procedure

(iii) known Census totals

The purpose of the weighting procedures is to make these adjustments. The result of the weighting procedures is that each respondent in the sample (and each person who has died or emigrated) has a final weight that is to be used for tabulation purposes. In calculating these final weights the initial weights of those non-respondents who were eligible for sample follow-up but who were not selected are effectively distributed between those persons who were selected in the random follow-up sample. The initial weights of any other non-respondents are distributed proportionately amongst respondents with the same basic known characteristics. The final stage of calculation performs a weight adjustment that ensures that any sample tabulation based on certain 1971 Census characteristics will be consistent with the corresponding tabulation from the 1971 Census data.

When final weights have been calculated any required tabulation is produced by summing the weights of all persons falling in each cell of the tabulation. In order to protect against violation of confidentiality all cell values will be randomly rounded to end in 0 or 5. Indications of reliability will also be provided for published tabulations.

9. DISSEMINATION OF RESULTS

At present the methods of disseminating the data produced by HQMS are still under discussion and therefore are not described here.

C. J. Brackstone
July 12, 1973

Instructions for Questions ㉒ to ㉕

- Fill *one circle only* on *each* line.
- If you have attended only part of a year at university or have attended the qualifying year, fill the circle for "University 1".
- If you have completed the 2nd (Sophomore) year at university but have taken three years to do so, fill the circle for "University 2".
- If you completed the 1st year in an Arts course then transferred to Medicine (or any other faculty) and completed the 1st year of it, fill the circle for "University 2".
- "Other" type of post-secondary schooling includes trade or business schools, institutes of technology, community colleges, CEGEP's (in Quebec), teachers' colleges, schools of nursing, etc. Be sure to fill the appropriate circle (None, 1, 2, 3 +).
- If you took one year in each of two different types of post-secondary schools (e.g., one year at a technical institute and one year at teachers' college), fill the circle for "Other 2".

"Yes, a university certificate or diploma (below Bachelor level)"
Fill this circle if you have *completed* a university certificate or diploma course, but have no university degree.

"Yes, Bachelor degree"
Fill this circle if your highest academic qualification is a Bachelor degree in the faculties of Arts, Science or Commerce (e.g., B.A., B.Sc., B. Comm. in a general or an honours course).

"Yes, First Professional degree"
Fill this circle if your highest academic qualification is a first level university degree in such specialized fields as medicine, dentistry, pharmacy, law, theology, education, engineering, architecture, forestry, etc.

"Yes, a Master's or equivalent, or earned Doctorate"
Fill this circle if you have an M.A., M.Sc., or other Master's degree or *equivalent* post-graduate diploma or certificate in medicine. If you have an earned Doctorate such as a Ph.D. or Ed.D., fill in this circle also.

2‚. How many years of schooling have you had since secondary school?

	None	1	2	3	4	5	6+
University ———————➤	O	O	O	O	O	O	O

	None	1	2	3+
Other *(See Instruction Booklet.)* ———➤	O	O	O	O	☐

2‚. Do you have a university degree, certificate or diploma?

Mark highest academic qualification.

- O No university degree, certificate or diploma
- O Yes, a university certificate or diploma (below Bachelor level)
- O Yes, Bachelor degree
- O Yes, First Professional degree
- O Yes, a Master's or equivalent, or earned Doctorate (*e.g., Ph.D., Ed.D.*)

APPENDIX C

SAMPLE SIZE IN HIGHLY

QUALIFIED MANPOWER

SURVEY

SAMPLE SIZE IN HIGHLY QUALIFIED MANPOWER SURVEY

Highest Degree Level	Sample Size
Bachelors, less than 4 years at university	2,983
Bachelors, 4 or more years at university	35,916
Ist Professional Degree	43,373
Master's or higher	55,699
Total	137,971

APPENDIX D

HIGHLY QUALIFIED MANPOWER

SURVEY QUESTIONNAIRE

Highly qualified manpower survey

GENERAL INFORMATION

This survey is being conducted to obtain information on the supply of Highly Qualified Manpower in Canada. Information on educational qualifications and their relationship to occupation and career development is required for formulating future government policy. All data you provide on this questionnaire are fully confidential under the provisions of the Statistics Act. Please return the completed questionnaire as soon as possible in the postage paid return envelope provided.

Should you have difficulty with any question, please refer to the Instruction Booklet.

PLEASE ANSWER ALL QUESTIONS UNLESS INSTRUCTED TO SKIP.

SECTION I – BASIC INFORMATION

QUESTION 1. IS YOUR NAME AND ADDRESS SHOWN ABOVE CORRECT? (Check (√) one box)

☐ YES – Skip to Question 2.

☐ NO – Correct name is: _____

Correct address is: _____

_____

_____

QUESTION 2. AT WHAT TELEPHONE NUMBER CAN YOU BE REACHED?
— WHAT IS THE BEST TIME TO CALL?

Area code	Number	Time

QUESTION 3. SEX (Check (√) one box)   ☐ Male   ☐ Female

QUESTION 4. WHAT WAS YOUR DATE OF BIRTH?

Day	Month	Year

For office use only

01			02		03	
04	05	06	07		08	09

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SECTION II – EDUCATION AND QUALIFICATIONS (Questions 5 and 6 are designed to obtain information on the educational and professional qualifications of university graduates residing in Canada.

QUESTION 5. DO YOU HAVE A UNIVERSITY DEGREE? (Check appropriate box)

☐ NO – Skip to Question 6.

☐ YES – Please list below all university degrees which you have been awarded, or for which you are currently studying, in the order in which they were (or will be) obtained. Please refer to Lists I and II below when coding and entering degree titles and major fields of study.

DEGREE (See List I)		MAJOR FIELD OF STUDY (See List II)		YEAR		UNIVERSITY (and country if outside Canada)	1 or office use only
Code	Title	Code	Name	Award-ed	Expect-ed		

Degree coding problems: (See note in List I below.)

LIST I: DEGREE – Write in the usual abbreviation of your degree title and select the appropriate degree code from the following list:

0. Pass or General B.A., B.Sc. or B.Com.
1. Honours B.A., B.Sc. or B.Com.
2. Other Bachelor Degrees (e.g., B.Agr., B.Ed., B.Eng.).
3. Undergraduate "licence" from a French language university (e.g., L.Sc.).
4. First Degree in Medicine, Dentistry or Veterinary Science (M.D., D.D.S., D.V.M.).
5. Other university degrees at the undergraduate level not included in codes 0 to 4.

6. University certificate or diploma following a Bachelor Degree – this code should only be used for courses of study that have a Bachelor Degree (or equivalent) as a prerequisite. Professional certifications, registrations or fellowships should not be included.
7. Master's Degree (including "licence" at the graduate level)
8. Doctorate (e.g., Ph.D., D.Sc.) – Do not include Honorary Degrees.
9. Other Post Graduate Degrees not included in codes 6 to 8.

Note: If you are not sure which code to use for a particular degree, use the space below the table to describe the degree.

LIST II: MAJOR FIELDS OF STUDY – From the list below, choose the name and code which best describes the major field of study of each degree (use only one code for each degree).

00. No Major (applicable only to general B.A.)

Education Teaching Fields

01. Elementary, kindergarten and pre-school
02. Exceptional groups of children (blind, deaf, etc.)
03. Physical and health education and recreation
04. Practical or vocational subjects (e.g., art, commerce, industrial arts, etc.)
05. Secondary school
06. Other teaching fields
Education – Non-teaching Fields
07. Counselling and guidance
08. Educational administration and organization
09. Educational psychology
10. Education (Unspecialized)
11. Other non-teaching fields (including theory)

Fine and Applied Arts

12. Art (including painting, print-making and sculpture)
13. Music
14. Other fine and applied arts (drama, interior design, etc.)

Humanities and Related

15. Classics, classical languages
16. History
17. Library and Records Science
18. Modern Language and Literature (English)
19. Modern Language and Literature (French)
20. Modern Languages and Literature (all others including comparative literature)
21. Philosophy
22. Religious studies (including Theology)
23. Translation and interpretation
24. Other humanities and related (creative writing, journalism, mass media studies, etc.)

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MAJOR FIELDS OF STUDY – Concluded

Social Sciences and Related

25. Administration and management, institutional (excluding schools, etc., but including hospital, hotel and restaurant administration)
26. Agricultural economics
27. Anthropology (including anthropolinguistics)
28. Archaeology
29. Area studies (Canadian studies, Islamic studies, etc., excluding those concerned primarily with the languages or literature of an area)
30. Business administration (unspecialized)
31. Commerce (specialization in accounting)
32. Commerce (unspecialized)
33. Commerce – Other specialized commerce or business administration (marketing, industrial relations, finance, etc.)
34. Criminology
35. Economics (except agricultural)
36. Geography (excluding earth science, urban and regional planning)
37. Law
38. Linguistics (excluding Anthropolinguistics)
39. Man/environment studies (regional, rural, urban, or town planning, community development; resource management, etc.; excluding landscape architecture, environment engineering)
40. Political Science (including military studies but excluding public administration)
41. Psychology, clinical (excluding vocational counselling)
42. Psychology, social (including industrial psychology but not educational)
43. Psychology, other (excluding educational psychology, school and vocational counselling and guidance)
44. Public administration
45. Secretarial science
46. Social work
47. Sociology (including Demography, Sociology of Education)
48. Other social sciences and related (general programmes, etc.)

Agriculture and Biological Sciences (excluding health professions)

49. Agriculture (excluding Agr. economics, Agr. engineering landscape architecture)
50. Biochemistry (non-medical graduates only)
51. Biology (including non-medical biophysics)
52. Botany (excluding paleobotany)
53. Dietetics and nutrition
54. Forestry
55. Household science and related (excluding dietetics, nutrition, interior design)
56. Veterinary medicine and science
57. Zoology (excluding paleontology) (including fishery science)

Engineering and the Applied Sciences

58. Aeronautical engineering (including astronautical, aero space)
59. Agricultural engineering

60. Architecture
61. Architecture – Landscape
62. Biomedical engineering (including biomedical electronics)
63. Geological engineering
64. Civil engineering (structural, hydraulic, sanitary, surveying, geodesy, transportation)
65. Electrical and electronics engineering
66. Engineering science, engineering physics
67. Geological engineering
68. Industrial engineering (including design and systems engineering)
69. Mechanical engineering
70. Metallurgical engineering, materials science
71. Mining engineering
72. Petroleum engineering
73. Other engineering (ceramics, environmental, forestry, marine, naval architecture, nuclear, ocean engineering, textile, etc.)

Health Specializations

74. Dentistry
75. Medicine, basic sciences (medical biochemistry, medical pharmacology, etc.)
76. Medicine, family or general practice
77. Medicine, medical specializations (internal, paediatrics, psychiatry, etc.)
78. Medicine, paraclinical sciences (medical bacteriology, medical immunology, medical parasitology, etc.)
79. Medicine, surgery and specializations in surgery (obstetrics, neurosurgery, heart surgery, etc.)
80. Nursing (including Nursing Education)
81. Pharmacy
82. Public health and hygiene
83. Rehabilitation medicine (occupational and physical therapy, audiology, etc.)
84. Other health specializations (optometry, medical technology, dental hygiene, etc.)

Mathematics, Physical Sciences, Earth, Marine and Space Sciences

85. Astronomy and astrophysics
86. Chemistry, analytical
87. Chemistry, inorganic
88. Chemistry, organic
89. Chemistry, other (excluding bio-chemistry)
90. Computer Science
91. Geology and related earth sciences (including geophysics, geochemistry, paleontology, paleobotany)
92. Mathematical Statistics
93. Mathematics, other (including actuarial science, operations research)
94. Metallurgy, materials science (excluding engineering)
95. Meteorology and other atmospheric sciences
96. Oceanography, marine science
97. Physics
98. Sciences (general)

QUESTION 6. DO YOU HAVE A CURRENTLY VALID LICENCE, CERTIFICATION OR REGISTRATION WHICH AUTHORIZES YOU TO PRACTICE A PROFESSION IN CANADA? (e.g. teaching certificate, registration as a professional engineer, accountant, etc.) (Check (✓) one box)

☐ NO – Skip to Question 7.

☐ YES –

* Title is	Authorized by
Title is	Authorized by

*e.g. First class teaching certificate authorized by Dept. Education, Ontario.

SECTION III — CAREER PROFILE. In Question 7, we are asking about your current job and certain jobs you have held in the [...] to the instruction booklet helpful when answering this question.

QUESTION 7. PLEASE COMPLETE EACH OF THE FIVE COLUMNS IN THE TABLE BELOW BY FOLLOWING THE

	A. CURRENT JOB	B. JOB OF LONGEST DURATION IN PAST TWELVE MONTHS
Note: If the answer to any part of this question is identical to an answer already given in an earlier column, write "same as column — "(A,B,C, or D) in the appropriate answer box. In part (v) below, please identify carefully any differences in main activities, duties or responsibilities that exist between the various jobs you describe.	☐ Not currently employed — Skip to B ——————▶ ☐ Currently employed — Complete this column by answering the questions on the left for your current job	☐ Not employed at all during the past 12 months — Skip to C ——————▶ ☐ Have been employed in the past 12 months — Complete this column for your job of longest duration in the past 12 months
(i) For whom did you work? (Name of firm, organization, level of government and department, etc. If self-employed without business name, give own name.)	Name of firm or organization _____ Dept., branch, etc.	Name of firm or organization _____ Dept., branch, etc.
(ii) Where did you work?	City, town or municipality _____ Province or country	City, town or municipality _____ Province or country
(iii) What kind of business or industry was this? (e.g., drug mfg.; provincial road construction; management consulting; university; etc.)		
(iv) What kind of work did you do in this job? (e.g., chemical research; civil engineering; management consulting; teaching; etc.)		
(v) What were your main activities, duties, responsibilities or functions? (e.g., directing chemical research; designing bridges; advising on business organization; teaching history; etc.)		
(vi) What was the title of your job? (e.g., director of chemical research; highway engineer; management consultant; professor; etc.)		
(vii) At what age did you begin this job?		
(viii) How long did you hold this job?	_____ Years _____ Months	_____ Years _____ Months
(ix) In this job were you mainly: working for wages, salary or commission? or Self-employed in own business, profession or farm? or Working without pay in a family business or farm?	(Check (√) one box) ☐ Working for wages or salary ☐ Self-employed in own unincorporated business, profession or farm ☐ Working without pay in a family business or farm	(Check (√) one box) ☐ Working for wages or salary ☐ Self-employed in own unincorporated business, profession or farm ☐ Working without pay in a family business or farm
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past. This information on career paths will be related to the major fields of study reported in Question 5. You may find reference

INSTRUCTIONS AT THE TOP OF EACH COLUMN AND WHERE APPLICABLE ANSWER QUESTIONS IF DIRECTED AND.

C. JOB AT AGE 40	D. JOB AT AGE 30	E. FIRST FULL-TIME JOB AFTER FIRST GRADUATING FROM UNIVERSITY
☐ Not yet 40 – Skip to D ⟶	☐ Not yet 30 – Skip to E ⟶	☐ Have never held such a job – Skip to Question 3 ⟶
☐ Not employed at age 40 – Skip to D ⟶	☐ Not employed at age 30 – Skip to E ⟶	☐ Have held such a job – Complete this column for your first full-time job after first graduating from university ⟶
☐ Employed at age 40 – Complete this column for your main job while aged 40 ⟶	☐ Employed at age 30 – Complete this column for your main job while aged 30 ⟶	
_____ Name of firm or organization	_____ Name of firm or organization	_____ Name of firm or organization
_____ Dept., branch, etc.	_____ Dept., branch, etc.	_____ Dept., branch, etc.
_____ City, town or municipality	_____ City, town or municipality	_____ City, town or municipality
_____ Province or country	_____ Province or country	_____ Province or country
_____ Years _____ Months	_____ Years _____ Months	_____ Years _____ Months
(Check (√) one box)	(Check (√) one box)	(Check (√) one box)
☐ Working for wages or salary	☐ Working for wages or salary	☐ Working for wages or salary
☐ Self-employed in own unincorporated business, profession or farm	☐ Self-employed in own unincorporated business, profession or farm	☐ Self-employed in own unincorporated business, profession or farm
☐ Working without pay in a family business or farm	☐ Working without pay in a family business or farm	☐ Working without pay in a family business or farm

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SECTION IV – RECENT ACTIVITY AND INCOME. Questions 8 and 9 are designed to provide information on the recent activity and income levels of university graduates in Canada so that they can be related to educational and occupational data.

QUESTION 8. ACTIVITY DURING PAST TWELVE MONTHS

	Number of weeks

IN HOW MANY WEEKS DURING THE PAST TWELVE MONTHS WERE YOU:

(i) Working in a full-time job? (Include weeks of self-employment, vacation and leave with pay) ....

(ii) Working in a part-time job? (Include weeks of self-employment, vacation and leave with pay, but exclude any weeks already reported in (i)) ....

(iii) Not working but looking for work? (Include all other weeks in which any part of your time was spent looking for work, but exclude any weeks already reported in (i) and (ii)) ....

SUB-TOTAL OF (i), (ii) AND (iii) ....

OF THE REMAINING WEEKS (IF ANY) OF THE PAST TWELVE MONTHS, IN HOW MANY WEEKS WAS YOUR PRINCIPAL ACTIVITY:

(iv) Going to university or school? ....

(v) Keeping house? ....

(vi) Retired? ....

(vii) Other? (Please specify activity, e.g. "volunteer work") ....

SUB-TOTAL OF (iv), (v), (vi) AND (vii) ....

TOTAL WEEKS **52**

QUESTION 9.   (i) WAGES AND SALARY INCOME?

What were your total wages and salaries, commissions, bonuses, tips, etc., during the past twelve months (before any deductions for personal income tax, pensions, etc.) .... ☐ None/or $ _____ /00

(ii) SELF-EMPLOYMENT INCOME?

What was your net income from self-employment or operating your own business, professional practice or farm during the past twelve months? (State total business, professional practice or farm income less expenses of operation, but before personal tax payments. If you suffered a loss, please give the amount and write "Loss") .... ☐ None/or $ _____ /00

(N.B.: If in either part you cannot estimate the amount received in the past twelve months, report the amount received during the 1972 calendar year and write 1972 below the amount.)

(iii) **TOTAL EMPLOYMENT INCOME** .... $ ============ /00

Day	Month	Year

QUESTION 10. ON WHAT DATE DID YOU COMPLETE THIS QUESTIONNAIRE? ....

COMMENTS:

THANK YOU FOR YOUR CO-OPERATION IN COMPLETING THIS QUESTIONNAIRE. PLEASE MAIL IT IN THE ENCLOSED PRE-PAID ENVELOPE.

APPENDIX E

LIST OF HIGHLY QUALIFIED MANPOWER

SURVEY VARIABLES AVAILABLE FOR

TABULATION

A. <u>Data collected in HQMS (data relates to September 1973)</u>

<u>Variable Name</u>	<u>Corresponding Question No. on HQMS Questionnaire</u>	<u>Categories or Coding Scheme</u>
1. Municipality of Residence	1	
2. Sex	3	Male, Female
3. Age	4	Single years
4. Number of Degrees	5	0,1,2,3,4,5 or more, unknow
5. 1st Degree – type'	5	0-9 as in List 1 on HQMS questionnaire or 'not state (see footnote)
6. 1st Degree – major field	5	00-98 as in List 11 on HQMS questionnaire or 'not state
7. 1st Degree – expected or awarded	5	Awarded, Expected
8. 1st Degree – year awarded	5	Single years
9. 1st Degree – university or country	5	University if in Canada, country or country group if outside Canada
10-24 Repeat 5-9 for 2nd, 3rd and 4th degrees	5	
25. Number of Licences, Certificates of Registrations	6	0, 1, 2, 3 or more
26. Licensing agency – 1st licence	6	Coding scheme to be specified
27. Licensing agency – 2nd licence	6	
28. Currently employed?	7A	Yes, No
29. Current Job, Municipality or Country	7A (ii)	

Footnote 1: Code 6 in List I will be subdivided into (a) certificates or diploma in the same field of study as an earlier Bachelor degree, and (b) certificates or diplomas in a different field of study.

	Name	Corresponding Question No. on HQMS Questionnaire	Categori... Coding Sch...
30.	Current Job, Industry	7A (i), (iii)	Standard Industry Classification (See attached list).
31.	Current Job, Occupation	7A (iv),(v),(vi)	Census Version of C.C.D.O. (4 digit code) (See attached list)
32.	Current Job, Starting Age	7A (vii)	Single years
33.	Current Job, Duration	7A (viii)	Single years & months
34.	Current Job, Class of Worker	7A (ix)	Wages or salary, Self-employed, Working without pay
35.	Employed in Past Twelve Months	7B	Yes, No
36-41	Same as 29-34 but for Job of Longest Duration in Past Twelve Months	7B (i) 7B (ix)	
42.	Job at Age 40?	7C	Not yet 40; Not employed at Age 40; Employed at age 40
43-48	Same as 29-34 but for Job at Age 40	7C (i) - 7C (ix)	
49.	Job at Age 30?	7D	Not yet 30; Not employed at Age 30; Employed at age 30
50-55	Same as: 29-34 but for Job at Age 30	7D (i) - 7D (ix)	
56.	1st Full-Time Job	7E	Have never held such a job; have held such a job
57-62	Same as 29-34 but for 1st Full-Time job after first graduating from University	7E (i) - 7E (ix)	
63.	Working full-time, weeks	8 (i)	
64.	Working part-time, weeks	8 (ii)	
65.	Looking for work, weeks	8 (iii)	
66.	Total working or looking, weeks	8	

name	Corresponding Question No. on HQMS Questionnaire	Categorie Coding Sch
67. Going to school, weeks	8 (iv)	Standard Class II
68. Keeping house, weeks	8 (v)	
69. Retired, Weeks	8 (vi)	
70. Other, weeks	8 (vii)	
71. Other, type of activity	8 (vii)	Volunteer work, other, Not stated
72. Total non Labour Force weeks	8	
73. Wages and Salary Income	9 (i)	None or Amount in $
74. Wages and Salary Income, year code	9 (i) (NB)	Past 12 months; Calendar Year 1972
75. Self-employed Income	9 (ii)	None or Amount in $
76. Self-employment Income, year code	9 (ii) (NB)	Past 12 months; Calendar Year 1972
77. Self-employment Income	9 (ii)	Amount shown is a loss; amount shown is a gain

B. Census Data (data relates to June 1st 1971)

All characteristics that were collected on the 1971 Census long-form (ie. for the 1/3 sample) will be available for tabulation. A list and description of these Census variables can be found in the publication 'Dictionary of the 1971 Census terms' (Statistics Canada Catalogue 12-540) supplemented by the attached lists of occupational and industry categories.

The number of very large cities in Canada is sufficiently small to allow a fairly close analysis of HQM migration.

To begin, we list Canadian municipalities of greater than 50,000 population by province.

List F.l Cities 50,000 and above by 1971 Census

Newfoundland (1)

    St. Johns 88,102

Prince Edward Island (0)

Nova Scotia (2)

    Dartmouth 64,770

    Halifax 122,035

New Brunswick (1)

    ·Saint John 89,039

Quebec (13)

    Hull 63,580

    La Salle 72,912

    Laval 228,010

    Longueuil 98,590

    Montreal 1,214,352

    Montreal Nord 89,139

    Quebec 186,088

    Ste. Foy 68,385

Ontario (20)

    Brantford 69,421

    Burlington 87,023

    Guelph 60,087

    Hamilton 309,173

    Kingston 59,047

    Kitchener 111,084

    London 223,222

    Mississauga 156,070

    Niagara Falls 67,123

    Oakville 61,483

    Oshawa 91,587

    Ottawa 302,341

    Peterborough 58,111

    St. Catherines 109,722

    Sarnia 57,644

    Sault Ste. Marie 80,332

APPENDIX F

CANADIAN CITIES

Quebec (continued)

    St. Laurent 62,955

    St. Leonard 52,040

    Sherbrooke 80,711

    Trois Rivieres 55,869

    Verdun 74,718

Manitoba (2)

    St. James-Assiniboia 71,431

    Winnipeg 246,246

Saskatchewan (2)

    Regina 139,469

    Saskatoon 126,449

Ontario (continued)

    Sudbury 90,535

    Thunder Bay 108,411

    Toronto 712,786

    Windsor 203,300

Alberta (2)

    Calgary 40,319

    Edmonton 438,152

British Columbia

    Vancouver 426,256

    Victoria 61,761

Yukon, Northwest Territories (0)

(Source: Adapted from Canada Yearbook 1972. Ottawa:

    Statistics Canada, 1972. pp. 1372 - 1377.)

Next we show the four largest cities within each Province with a
population above 10,000.

List F.2 Four largest cities above 10,000 by province

Newfoundland (2)

    St. Johns 68,102

    Corner Brook 26,309

Prince Edward Island (1)

    Charlottetown 19,132

Nova Scotia (6)

    Halifax 122,035

    Dartmouth 64,770

    Sydney 33,230

    Glace Bay 22,440

Manitoba (10)

    Winnipeg 246,246

    St. James-Assiniboia 71,431

    St. Boniface 46,714

    St. Vital 32,963

Saskatchewan (7)

    Regina 139,469

    Saskatoon 126,449

    Moose Jaw 31,854

    Prince Albert 28,464

New Brunswick (7)		Alberta (2)	
St. John	89,039	Edmonton	438,152
Moncton	47,891	Calgary	403,319
Fredericton	24,254	Lethbridge	21,217
Bathurst	16,674	Red Deer	27,674
Quebec (84)		British Columbia (18)	
Montreal	1,214,352	Vancouver	426,256
Laval	228,010	Victoria	61,761
Quebec	186,088	New Westminster	42,835
Longueuil	97,590	Prince George	33,101
Ontario (64)		Yukon, Northwest Territories (1)	
Toronto	712,786	White Horse	11,217
Hamilton	309,173		
Ottawa	302,341		
London	223,222		

(Source: See Source List F.1)

Third, we present Canadian urban areas by size.

List F.3. Census metropolitan areas based on Statistics Canada census agglomerations

Table F.31
Major Urban Areas
CMA—RMR 1971, 22 largest *

Montreal	2,743,208
Toronto	2,628,043
Vancouver	1,082,352
Ottawa-Hull	602,510
Winnipeg	540,262

Table F.32
Provincial Distribution of
CMA—RMR by province

Newfoundland	1
Prince Edward Island	0
Nova Scotia	1
New Brunswick	1
All Atlantic	3

(Table F.31 continued)

Hamilton	498,523
Edmonton	495,702
Quebec	408,502
Calgary	403,319
St.Catharines-Niagara	303,421
London	286,011
Windsor	258,643
Kitchener	226,846
Halifax	222,637
Victoria	195,800
Sudbury	155,424
Regina	140,734
Chicoutimi-Jonquiere	133,703
St. John's, Newfoundland	131,814
Saskatoon	126,449
Thunder Bay	112,093
St. John, N.B.	106,744

(Table F.32 continued)

Quebec	3
Ontario *	9
Manitoba	1
Saskatchewan	2
Alberta	2
All Prairies	5
British Columbia	2
Total	22

*N.B.: Ottawa-Hull is counted in Ontario

*Table 8 (92-708 for areas included.

(Source: Adapted from 1971 Census of Canada: Population, No. 92-708.

Ottawa: Statistics Canada, January, 1973.)

Finally, we settle on the following list of Census Metropolitan
Areas (CMAs).*

Calgary, Alberta	Regina, Saskatchewan
Charlottetown, P.E.I.	Saskatoon, Saskatchewan
Edmonton, Alberta	Saint John, New Brunswick

(List of CMAs continued)*

Halifax, Nova Scotia	St. Catherines-Niagara, Ontario
Hamilton, Ontario	St. John's, Newfoundland
Kitchener-Guelph, Ontario	Toronto, Ontario
London, Ontario	Vancouver, British Columbia
Montreal, Quebec	Victoria, British Columbia
Ottawa-Hull, Ontario	Windsor, Ontario
Quebec, Quebec	Winnipeg, Manitoba

* For a list of municipalities included in these CMAs,

see Table 8 in Statistics Canada Publication 92-708.