

SUPPLEMENT B – GIS Procedure for Mapping Labour Force Distribution

The steps taken in the mapping the labour force distribution using the ecumene framework are presented in Fig. B-1 and described as follows:

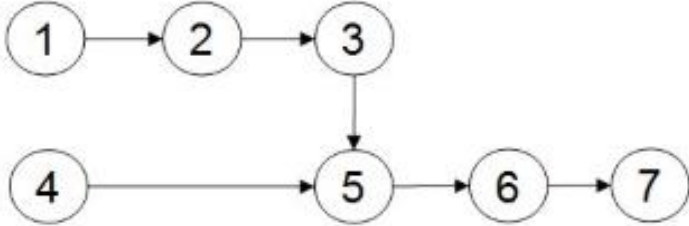


Figure B-1. GIS Processing Steps Schema for Mapping Labour Force Distribution.

1. A custom tabulation of labour-force data provided by StatsCan (2018) is used as a primary input in the analysis. Tables for both employment (numbers of jobs) and income (\$Cdn), indexed by economic sector using the North American Industrial Classification System (NAICS) were provided at the census subdivision (CSD) level for the census periods 2001, 2006, 2011, 2016. The primary count data were aggregated from CSDs to ecumene places using the concordance tables provided with the Ecumene GIS database (Eddy 2020).
2. The data were then aggregated for each census year according to major economic sectors shown in Figure B-12 and listed in Table B-1.
3. Two Labour Force Distribution (LF) indexes (LFIs) were calculated for each ecumene place using the following formula:

$$LF_{Si}^B = S_i / B_i$$

Where: LF = Labour Force Index, for a given sector (*S*) as a proportion of the Base Sectors (*B*), based on Income (*i*). For ratios based on employment data (numbers of jobs), *i* is replaced by *e*, and for ratios as a proportion of All sectors, *B* is replaced by *A*, where *A* is the total for All sectors (which are Base Sectors plus Service Sectors in Table B-1 and Figure B-1).

4. The outer boundary of the ecumene extent (shown in Figure 4 of the main text) is included as the geographic base to limit the extent of the spatial interpolation. This boundary is derived from a 2-km buffer of all ecumene places combined with transportation and utility networks.
5. A spatial interpolation was applied using the inverse distance weighting (IDW) method in ArcGIS Spatial Analyst with the following parameters:

Output cell size: 2000 m
Power function: 2
Search radius type: Variable
Number of points: 20
Search distance: 50000 m

6. The for cartographic presentation, the resulting raster values are is classified into the following intervals:

0.00 – 0.05
0.05 – 0.10
0.10 – 0.15
0.15 – 0.25
0.25 – 1.00

7. Additional cartographic elements and information layers are added for reference (e.g. mills, management areas).

Additional Notes:

- Steps 1-7 are repeated for each census year, and for each sector of interest. The map shown in Figure 8 in the main text is for the forestry sector for the year 2006.
- The same formula is used for the calculation of LF for other natural resource sectors as per the categories in Table B-1:
AGR – Agriculture, FIS-Fishery, FOR-Forestry, MIN-Minerals, and PET-Petroleum and Coal
- The maps shown in Supplement C were calculated as average values for all census years 2001-2016 for each sector.

**TABLE B-1. NAICS Sector Classification for Major Groups,
Base Sectors and Service Sectors.**

NAICS Classification - Sectors and Sub-sectors		Major Sectors
Base Sectors	111 - 112 Farms	AGR
	113 Forestry and logging	FOR
	1141 Fishing	FIS
	1150 Support activities for farms (1151 and 1152)	AGR
	1153 Support activities for forestry	FOR
	211 Oil and gas extraction	PET
	212 Mining and quarrying (except oil and gas)	MIN
	22 Utilities	UCM
	23 Construction	UAC
	31-33 Manufacturing	MTT
	321 Wood product manufacturing	FOR
	322 Paper manufacturing	FOR
	324 - Petroleum and Coal Product Manufacturing	PET
	326 - Plastics and Rubber Products Manufacturing	PET
	327 - Non-Metallic Mineral Product Manufacturing	MIN
	331 - Primary Metal Manufacturing	MIN
	332 - Fabricated Metal Product Manufacturing	MIN
	41 Wholesale trade	MTT
	48-49 Transportation and warehousing	MTT
Service Sectors	51 Information and cultural industries	COM
	52 Finance and insurance	COM
	53 Real estate and rental and leasing	COM
	54 Professional, scientific and technical services	COM
	55 Management of companies and enterprises	COM
	56 Administrative and support, waste management and remediation services	COM
	61 Educational services	HAE
	62 Health care and social assistance	HAE
	71 Arts, entertainment and recreation	HAR
	72 Accommodation and food services	HAR
	81 Other services (except public administration)	COM
	91 Public administration	GOV

Major Sectors Model

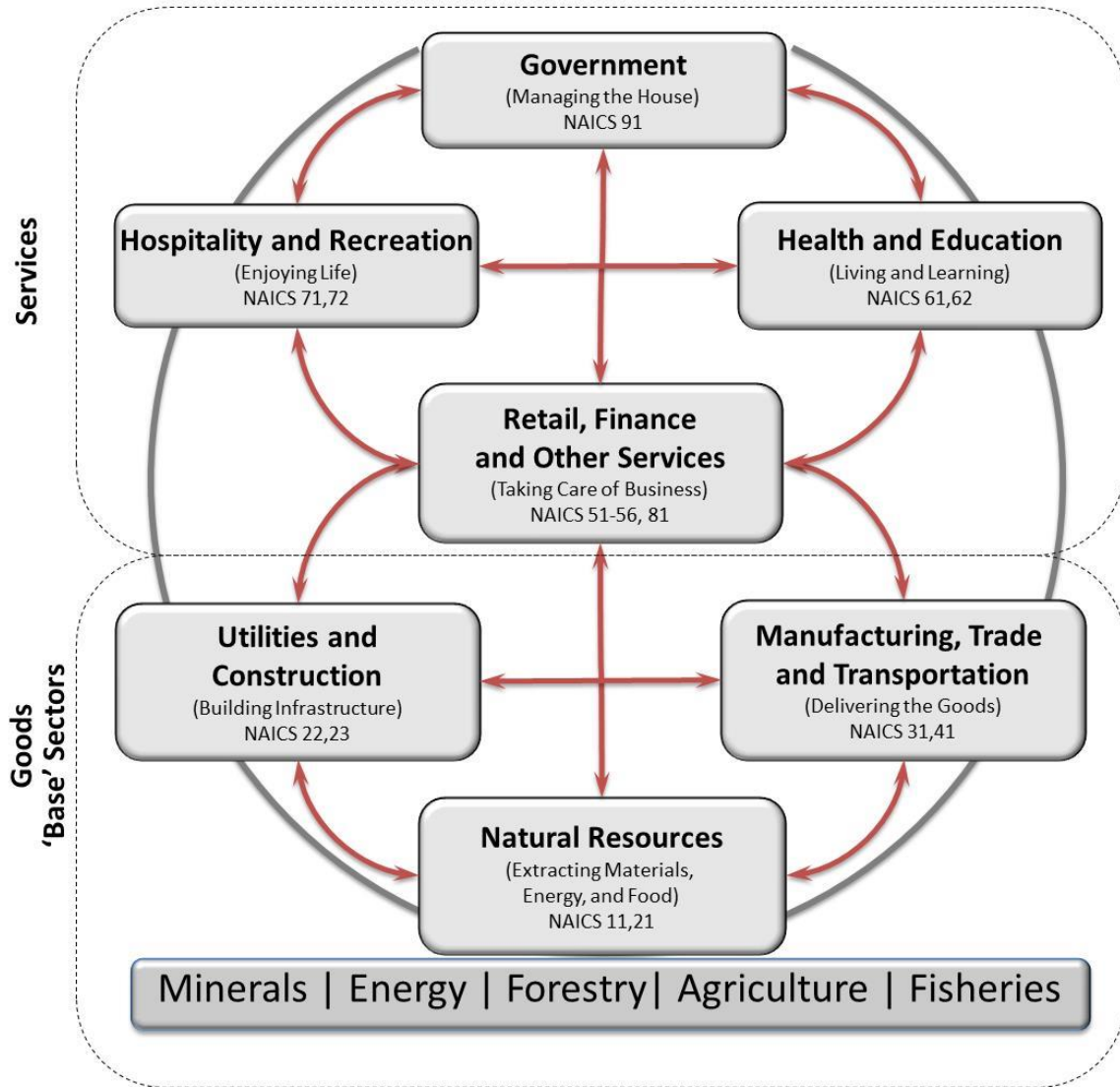


FIGURE B-1. Major Sectors Model for Calculating and Mapping Labour Force Distribution.