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**Options for an Aggregation Structure for the North American Product
Classification System (NAPCS)**

Statistics Canada

Options for an Aggregation Structure for the North American Product Classification System (NAPCS)

by Statistics Canada¹

Introduction

The development of an aggregation structure has only recently come to the forefront of trilateral work on the North American Product Classification System (NAPCS). While a draft structure was adopted at the September, 2004 meeting of the Trilateral Steering Committee on NAPCS and NAICS, it did not guide further product development. More recently, the United States updated the aggregation structure by adding detailed products from the United States Economic Census, and making some minor modifications to the structure.

In the Canadian context, the aggregation structure is intended to provide more than a way to organize data for publication. More fundamental to the operation of the statistical system, the structure should provide a general-purpose classification of goods and services that can be used directly by the System of National Accounts and the feeder surveys that provide data to that System.

From the beginning of the development of NAPCS, it was agreed that a demand-based aggregation structure should be developed (i.e., grouping together products that satisfy a given need or purpose). The challenge is to find a single set of categories that can accommodate both intermediate demand (goods and services purchased by businesses as inputs to the production of goods and services) and final demand (by households, businesses and governments). Another challenge is to define detailed NAPCS classes so that they roll up to these higher level demand-based categories.

This paper describes the current provisional structure for NAPCS and the challenges it poses; and presents a number of options for a revised NAPCS aggregation structure, for consideration.

The Current Structure

The high-level groups for products primarily purchased by households in the 2004 structure are:

- 1 Food, beverages, and tobacco products
- 2 Clothing, footwear, personal accessories, and related products
- 3 Housing and related products
- 4 Home furniture, furnishing and accessories, and related products
- 5 Home operation products
- 6 Home security, safety, and related products
- 7 Home entertainment, recreation and culture products
- 8 Household pets and related products

¹Written by Alice Born and Ken Young of Statistics Canada. This paper presents the opinion of the authors and does not officially represent the views of Statistics Canada or the Trilateral Steering Committee for NAPCS and NAICS.

- 9 Automobiles, light-duty trucks, and local passenger transportation products
- 10 Leisure and long-distance travel, tourism, and accommodation products
- 11 Educational products
- 12 Health care products for persons
- 13 Personal care products and related products
- 14 Death care products for persons and related products
- 15 Personal financial and related products, n.e.c.
- 16 Personal legal and related products
- 17 Household and personal products, and related products, n.e.c.
- 18 Public, community, and social services, n.e.c.

A more recent version keeps this structure, with one change, the deletion of Group 6 *Home security, safety, and related products*, with the products in that group re-allocated to others.

Products primarily consumed by business and government are structured using the following product groupings:

- 19 Non-residential constructions and related products
- 20 Equipment and related products
- 21 Intellectual property products
- 22 Labour supply and related products
- 23 Non-residential distribution of energy
- 24 Non-residential water, sewer, and environmental services
- 25 Material inputs and supplies to production, n.e.c.
- 26 Goods transportation services and related products
- 27 Other service inputs to production, except manufacturing services, n.e.c.
- 28 Manufacturing services
- 29 Public administration services

The more recent version retains these groups, with some minor name changes.

Conceptual Rationale for the Structure

Both the 2004 and the 2009 structures attempt to organize products based on whether they are primarily purchased by households, or by businesses and government. The household product groups (1-18) were developed using the Canadian Consumer Price Index items as a starting point, but were considerably modified. The business product groups are based on categories from the KLEMS production model².

The household product groups do not correspond to any particular economic model but they have been thought of as corresponding to personal expenditures in the national accounts. However, national accountants prefer to use the Classification of Individual Consumption by Purpose (COICOP) to classify personal expenditures.

The KLEMS categories used for the business product groups is also a national accounting

² See Bureau of Economic Analysis, *Introducing KLEMS Input Estimates for 1997–2003*, by Erich H. Strassner, Gabriel W. Medeiros, and George M. Smith, accessed at http://www.bea.gov/scb/pdf/2005/09September/0905_Industry.pdf

framework. It provides a framework for partitioning the output of an industry into value added (**K**apital and **L**abour) and Intermediate Inputs (**E**nergy, **M**aterials and **S**ervices).

Immediately a problem for using this to organize products is evident – capital and labour are not products in this framework but primary inputs. In the NAPCS structure, non-residential constructions, and machinery and equipment products have been substituted for capital, and labour supply products have been substituted for labour.

The intermediate products energy, materials and services are represented by several product groups. Finally, there is a product group for intellectual property products.

Taking all these together, the existing NAPCS structure could be described as one that seeks to represent the cost structure of households and businesses. Products are mapped to household and business cost categories.

There are two difficulties with this approach.

The first is that products do not map easily into this framework, for two reasons. One is simply that many products were not defined with this in mind. As well, some products are the same whether consumed by businesses or households. Electricity consumed by a household is no different than that consumed by a business. Flour consumed by a household is no different than flour used by a restaurant. The quantities purchased may be different, but the quantity purchased is not a product characteristic.

Secondly, even when products can be mapped into a cost framework, useful groupings may not arise because of the partial nature of the groupings, necessarily consisting of only some of the relevant products. For example, if we have a product grouping for food consumed by households, and a product grouping for food consumed by business as an intermediate input, flour will be in one but not the other. One of the product groups will not include an important product. Attempts to get around this include distinguishing flour by the quantity purchased, or estimating a class of customer breakdown. However, these are only possible in some cases.

The underlying reason for the difficulty in applying a sectoral model of costs to a product classification is that the objective for a NAPCS aggregation structure is to account for all products. Cost models, such as KLEMS, work because they have a restricted area of application.

Alternative conceptual frameworks

The practical alternative seems to be to focus on the purpose to which a product can be applied. So, food comprises products which one can eat.

Not that much has to change, at least at the higher levels of the structure. Continuing with the example of food, we would not try to distinguish food consumed by households from food consumed by restaurants. However, we could continue to try to distinguish food from food ingredients or materials.

In that case, we might say that flour is a food material, while bread is food. The advantage of this is that this approach relies on the characteristics of the products themselves, and not on the characteristics of producers or purchasers.

Applying this at the detail level is not without its own problems. For example, it is common in the Canadian manufacturing products to have detailed products that include both end-use goods and intermediate-use goods. We have identified some of these, for example products which combine machinery with machinery parts. They should be revised to avoid this problem. However, by doing so, we will have products that serve more uses, not least of which is those of the system of national accounts.

COICOP

No discussion of product structure is complete without addressing the Classification of Individual Consumption by Purpose (COICOP)³. COICOP has been adopted by many statistical agencies, for one or more of three purposes. The first is the classification of personal expenditures in systems of national accounts. The second is the classification of items in consumer price indexes, and the third is the classification of expenditures by households in household expenditure surveys. Not all countries use COICOP for all three types of program, but in an idealized system household expenditure surveys provide weights for consumer price indexes, and the latter provide prices with which to deflate personal expenditures in national accounts.

The NAPCS structure could ignore COICOP, could adopt it without modification, or could adopt it in a modified form.

Neither the 2004 NAPCS aggregation structure, nor the 2009 version, use COICOP.

The highest (Division) level of the COICOP structure has twelve levels:

- 01 Food and non-alcoholic beverages
- 02 Alcoholic beverages, tobacco and narcotics
- 03 Clothing and footwear
- 04 Housing, water, electricity, gas and other fuels
- 05 Furnishings, household equipment and routine household maintenance
- 06 Health
- 07 Transport
- 08 Communication
- 09 Recreation and culture
- 10 Education
- 11 Restaurants and hotels
- 12 Miscellaneous goods and services

Modifications that various agencies have made include:

- Ignoring illegal activities (narcotics in Division 2, prostitution in Division 12);
- Combining food and non-alcoholic beverages with alcoholic beverages to create a food and beverages division;
- Treating tobacco separately from food and beverages, by including it in Division 12;

³ See United Nations, *Classifications of Expenditure According to Purpose: Classification of the Functions of Government (COFOG); Classification of Individual Consumption According to Purpose (COICOP); Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI); Classification of the Outlays of Producers According to Purpose (COPP)*. ST/ESA/STAT/SER.M/84. New York: United Nations, 2000.

- Deleting Division 11, Restaurants and hotels, because it is an industry category rather than a product category. Instead, meals consumed outside the home are put in the same Division as food consumed in the home, and temporary accommodation services are included in a travel category;
- Including or excluding expenses associated with owner-occupied housing depending on whether the concept is consumer prices (in which case included) or personal expenditures in the national accounts (excluded)

For NAPCS, the main problem with COICOP is the same one that affects the 2004 and 2009 structures. COICOP was designed to be used in a context in which only household expenditures were being considered. Consequently, food in COICOP includes not just bread, but flour.

One approach that could be tried is to create a structure that applies a product-characteristic approach but using building blocks that can be re-organized into COICOP.

Intermediate Inputs

A NAPCS structure based on use or purpose would have one or more high-level product groups for intermediate goods and services. The structure would be defined based on the characteristics of the products themselves, rather than the using industries. This does not produce a great deal of change. Instead of “inputs to clothing industries” there will be “textile fabrics”. However, the change makes the classification more transparent. Just about anything could be an input to a clothing factory; textile fabrics can be clearly defined.

One area that needs to be addressed is the treatment of intellectual property. What is the purpose of IP? Should it be treated as having its own purpose, and consequently be in one product group as in the current structure?

Conclusion

Statistics Canada is developing an update to the structure, based on these ideas. We believe that a revised approach is needed in order to develop a practical classification structure for NAPCS.