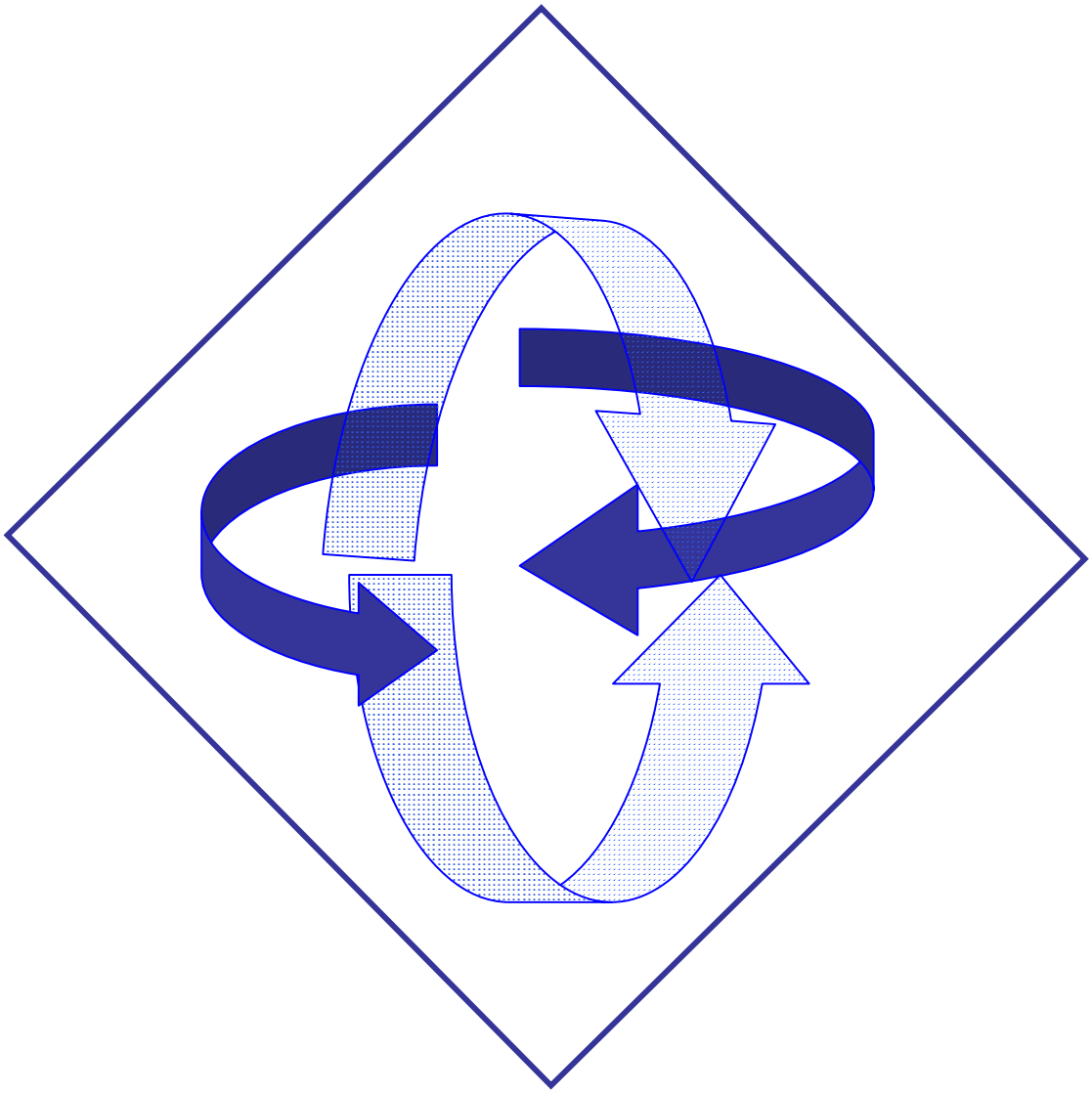
Implementing the North American Industry Classification System: The Canadian Experience



Prepared by:

Michel Girard
Director

Andreas Trau
Senior Classification Analyst

Input-Output Division
System of National Accounts
Statistics Canada

April 2004

Statistics Canada Statistique Canada

Canada

Implementing the North American Industry Classification System: The Canadian Experience[1]

Introduction

In Canada, industry statistics have been compiled according to many classifications. In the Canadian System of National Accounts (CSNA), detailed industry statistics from 1961 onwards are classified on the basis of three versions of the Standard Industrial Classification (SIC) as well as the North American Industry Classification System (NAICS) which was implemented in reference year 1997.

The three SICs were issued by Statistics Canada or its predecessor, the Dominion Bureau of Statistics. All three followed the same principles of classification and the latest version, the 1980 SIC, had more details for emerging industries. There was not much difficulty in reporting consistent industry statistics over the three SICs, as their industrial structure were very comparable. The implementation of NAICS proved to be much more challenging.

NAICS is the joint product of three countries, Mexico, the United States and Canada. NAICS differs significantly from the SICs because it is based on a single organizing principle, contrary to the SICs where entities are sometimes grouped according to production-oriented principles and sometimes grouped according to demand-based principles. NAICS is based on a production-oriented or supply based conceptual framework where producing units using identical or very similar production processes are grouped. The difference in orientation between NAICS and the SICs has created discontinuities in time series. Even at major levels of aggregation, such as retail and wholesale trade, the differences in values between the two classifications are substantial, creating dilemma both for compilers and users of the detailed industry statistics.

Prior to the implementation of NAICS, the input-output accounts and other GDP industry programs of the CSNA produced consistent statistics for 167 industries from 1961 to 1997. The statistics were derived from a framework of 203 industries for the 1961-1980 period and 243 for the period 1981-1997. It was very difficult to maintain a consistent set of industries from 1961 when NAICS was implemented. The number of industries consistent from 1961 onwards diminished to 113, and many of them showed sizeable breaks in 1997. This, despite having increased the I-O framework to 300 industries. It is worth noting that the commodity detail of the IO framework has remained coherent despite the introduction of NAICS. It was fairly easy to maintain the continuity of 476 commodities from 1961 onwards.

Time Series Continuity and SIC

The input-output industry classification (IOIC) is used to define the industries for which GDP estimates are compiled. Prior to reference year 1997, this industrial framework was defined in terms of the industry definitions provided by the Standard Industry Classification (SIC) of 1960, 1970 and 1980. For the 1961 to 1980 period, the IOIC had 203 industries. These industries were expanded to 243 with the implementation of the 1980 SIC. The IOIC was designed to be relatively more stable over time than do the three SICs collectively.

---

1 This document is the product of a collaboration between Andreas Trau and Michel Girard, Input-Output Division, Statistics Canada

There are four levels of hierarchy in the input-output industry classification. They are referred to as the small (S), medium (M), link (L), and worksheet (W) levels. The S level is the highest level of aggregation while W has the greatest number of categories. The L level is also referred to as the "historical" link level because it is the lowest level of aggregation for which industry definitions are relatively stable across the three SICs.

In constructing the industry definitions at the L level, certain quantitative criteria were used in order to determine the continuity. The SNA industry codes were built from the various SIC definitions, and when a new SIC was introduced, establishments were reclassified from one industry to another. If the value added for an industry changed too much on account of this reclassification, the value added series for that industry was not considered to be continuous time series. Near equality of value added, however, was not a sufficient criterion. The value added of incoming establishments could be large and nearly equal to the value added of outgoing establishments. In this case the composition of the industry would have changed substantially while total value added changed only marginally. As a result, a second criterion was also employed to define continuity: the value added of incoming plus outgoing establishments had to be small relative to value added before reclassification.

Consequently, in order to ensure continuity, special groupings were created in order to provide definitional continuity across the three SICs. Even though it was possible to preserve the continuity of many industry groupings over time, the resulting L classification was never a good representation of the most current SIC and its aggregation, making difficult the reconciliation with other economic statistics produced by the Agency. In several cases, industries could not be mapped into 3-digit 1980 SIC classes; several industries encompassed one or more 3-digit SIC classes as well as more 4-digit classes of another 3-digit SIC class. This was taken into consideration when NAICS was implemented.

Time Series Continuity and NAICS

It would have been very expensive, even if it were possible, to re-code the establishments on a NAICS basis back to 1961 for all or several sectors of the economy. The costs would have been astronomical to reprocess all this information. Given time and resources constraints, other options were developed to backcast the series and reconstruct consistent CSNA industry statistics. Much of the strategy was based on the availability of a coherent set of commodity data from 1961 onwards.

The implementation of NAICS into the IOIC resulted in the creation of a new W industry structure containing 300 industries that was defined in terms of NAICS. Following the creation of the NAICS-based W industries, work began on creating NAICS-based historical L level industries that would be used to create a historical time series going back to 1961. At the time, the criteria for the new NAICS-based L level industries were as follows:

- the new NAICS industries had to be **based on NAICS**[2],
- they had to be constructed in such a way that each SIC-based W level industry had to be linked to **one and only one** NAICS L industry,
- the breaks in series of allocating SIC W into NAICS L industries had to be **less than 5%**.

2 This was to avoid shortcomings related to the implementation of SIC where in several cases, industries could not be mapped into a 3-digit 1980 SIC classes; several industries encompassed one or more 3-digit SIC classes as well as one or more 4-digit classes of another 3-digit SIC class.

The results of this exercise yielded two undesirable consequences. First, to satisfy the conditions above, it was necessary to aggregate industries to a level that were not analytically useful. The best example is the regrouping of air, water and rail transportation as well as scenic and sightseeing and services incidental to transportation. The other undesirable consequence was that in some cases, no matter how the NAICS L industries were created, they still resulted in large breaks. This was caused by the fundamental difference between the SIC and NAICS structures. Perhaps the best example of this is the treatment of repair services under NAICS, where all repair services are produced by the same NAICS industry, whereas in the SIC, some repair activities are produced by the personal services industry, some are produced by the retail trade industry and others are produced by the wholesale trade industry.

A complete list of the original 113 NAICS-based historical link-level industries and their discontinuities, both in terms of gross output and GDP at basic prices, caused by allocating or forcing an SIC W industries to one and only one NAICS L industry, can be found at: http://dissemination.statcan.ca/english/sdds/1401.html#document. The document also indicates, for outputs, the nature of the discontinuity such as the amount of the outputs in terms of commodities that was removed (or added) from a given industry and where it was added (or removed).

There was no easy solution to resolve the problem of statistical breaks in 1997. The methodology has involved, fundamentally, an examination of the commodity composition of production of each link level industry. The examination was restricted to the commodity composition because a continuous time series for commodities exists for the entire 1961 and onwards period.

A decision was made to remove the breaks in the industry statistics in order to give users a more homogeneous historical time series. The criteria to produce a time series back to 1961 were modified:

- the new NAICS industries had to be **based on NAICS**[3],
- they **no longer** had to be constructed in such a way that each SIC-based W level industry had to be linked to **one and only one** NAICS L industry,
- the breaks in series of allocating SIC W into NAICS L industries had to be **less than 2%**.

In summary, the methodology followed a two-stage process:

- For each SIC-NAICS paired industry, it was determined which additional commodity was produced and how much was added to the NAICS basis from the SIC basis. The input structure of the NAICS industry in reference year 1997 was then used to move inputs from the SIC to NAICS industry.
- Inputs were than forced mechanically to be equal to predetermined control totals.

Prior to this work, a lot of effort had been put into establishing a good concordance between SIC-NAICS results for reference year 1997. First, NAICS results were calibrated to SIC results, which helped our clients better understand the size and the nature of the discontinuity, notably in terms of commodity outputs. This created a database for the reference year 1997 that would help backcast the NAICS structure back to 1961.

The remainder of this document explains the issue related to the implementation of NAICS and describe the initiatives taken by the CSNA to create a smoother industrial time series for the period between 1961 and 1996 to the period for 1997 and onwards.

---

3 This was to avoid shortcomings related to the implementation of SIC where in several cases, industries could not be mapped into a 3-digit 1980 SIC classes; several industries encompassed one or more 3-digit SIC classes as well as one or more 4-digit classes of another 3-digit SIC class.

Building NAICS-SIC Concordance for 1997

In order to better understand and to quantify the relationship between the NAICS and the SIC, the 1997 Input-Output Tables were produced on both industrial bases. The Preliminary 1997 I-O Tables were constructed first using SIC-based industrial estimates and then converted to NAICS. To convert the 1997 SIC-based estimates to NAICS, a concordance was created between the two industrial classification systems at the W-level[4], the level at which the I-O tables are constructed.

In the case of many business and personal services industries, they were surveyed for the first time, making it difficult to build a concordance between the SIC and NAICS. Establishing a concordance was also difficult due to the fact that most SIC industries map to more than one NAICS industry. As well, some entities were moved from goods-producing industries to services-producing industries and vice versa, requiring the reconciliation of data from different surveys.

Analysts computing I-O Tables often relied on administrative data[5] to build concordances. Analysts were able to take advantage of the fact that the central business register was double-coded and that it could be used to compute SIC and NAICS-based results derived from administrative fiscal files. Wages and salaries from administrative sources were coded to both the SIC and NAICS and then used to determine the wage component of each linking NAICS industry for a given SIC industry. In those cases where the linking NAICS industries were deemed to be significant, estimates were made by commodity, for outputs, intermediate inputs and GDP. The estimates were made such that the sum, for each commodity of the linking NAICS industries, was equal to the total for each commodity of the SIC industry. In addition, the allocated outputs and inputs to the linking NAICS industries were always balanced such that the sum of outputs was equal to the sum of inputs. The balanced linking NAICS industries are referred to as “split industry vectors”.

Analysts were also able to derive a series of control totals for gross outputs and the GDP components, labour income, mixed income and operating surplus. These were subsequently used to calibrate outputs, intermediate inputs and GDP of the SIC-NAICS industries. NAICS surveys results implemented in 1998 were also used to refine the concordances.

For the Final 1997 I-O Tables, the opposite procedure took place. The industries were first estimated using NAICS-based data and converted to SIC-based industries using the same procedures as outlined above. The “split industry vectors” were amended to reflect the differences (revisions) between the converted and estimated NAICS-based industries when the 1997 Tables were finalized the year after. This conversion process only took place for the non-manufacturing industries. For the manufacturing industries, the source data came coded to both the SIC and NAICS, both for the 1997 Preliminary and Final I-O Tables. It was important to estimate the 1997 I-O Tables using both SIC- and NAICS-based estimates in order to assess the quality of the converted information as well as to provide the best possible NAICS estimate for the first NAICS-based I-O Tables.

The SIC-NAICS concordance was relatively easy to establish for some industry groupings. In a few cases, there were no fundamental differences between the two structures, most notably in the primary industries. For some groupings of industries, such as construction, non-profit institutions serving

---

4 In the I-O tables, there are 243 SIC-based worksheet (W) level industries and 300 NAICS-based worksheet (W) level industries.

5 Data provided by the Canadian Custom and Revenue Agency

households, and government services, the IOIC follows neither the NAICS or the SIC structure, thus posing no problems for the conversion. In the CSNA, for statistical reasons, public administration statistics are compiled on a sector basis. Also, to make their compilation easier, construction statistics are derived by "type of construction", not by industry.

In the cases of manufacturing[6] (and mining) survey data were processed on both bases for reference year 1997, making the transition fairly straightforward. Data were originally collected and processed on an SIC basis. Subsequently, helped by a business register that was both SIC and NAICS coded, survey results were re-estimated. In the cases of manufacturing, the double coding exercise started well before the implementation of NAICS. The systematic recoding of micro records of previous years, referred as backcasting, was done for a few years. This exercise was only possible due to the wealth of information available for this segment of the economy. The work required several steps:

- Largest outputs were used to assign NAICS code when there was a unique relationship between the primary outputs and a NAICS code.
- When step 1 was insufficient, then inputs were examined
- Remaining units were coded using a pre-determined concordance table, creating problem when there was a SIC splits into many NAICS codes.

A Nature of Business Survey asking questions about the kind of activity of the establishment was eventually conducted to improve the coding. Despite all these efforts, there were still a lot of fluctuations in the backcasted data and it took several months of work to improve the time series. In many cases the work consisted in recoding all records where one year's classification was different from the classification of all other years.

The double coding exercise has greatly helped to produce consistent NAICS survey results for few years prior to 1997 and was greatly appreciated by users. Among others, it facilitated the production of statistics related to the Kyoto Protocol. For national accountants, since infra-annual series were also backcasted and benchmarked to new NAICS control totals, this has facilitated the seasonal adjustment of monthly GDP indicators.

Summary of the Algorithmic Conversion Process

The next step was to produce an algorithm that would use the information from the Final 1997 I-O Tables to convert SIC defined industries to NAICS-based historical link-level industries. The algorithm would now take into account the fact that the SIC industries could correspond to more than one NAICS industry. The algorithm would also take into account the availability of detailed information of the differences between the two industry classifications at the I-O industrial working level, in terms of commodity outputs, inputs and Gross Domestic Product (GDP).

The remainder of this document provides some technical details of the SIC to NAICS conversion process used to convert 1961 to 1997 SIC-based I-O Tables to NAICS-based I-O tables based on 119 NAICS-based historical link-level industries and 476 historical link-level commodities. The information provided, although more technical than the rest of this document, is nevertheless a simplified description of the algorithm used to produce the historical series. Tables summarizing the process are presented in Appendix 1.

---

6 Manufacturing Industries in Canada: National and Provincial Areas, 1998, Statistics Canada – Catalogue no.31-203-XPB

The first step in the algorithmic conversion process was to convert the outputs. The relationship derived in reference year 1997 between the SIC and NAICS made it possible to know, for each commodity output of a given SIC industry, which NAICS industry, by value, these commodities corresponded to. The values allocated to the NAICS industries formed the basis of a pattern that was then normalized, such that the sum, for a given output commodity, of the corresponding NAICS industries, was equal to 1.00. The normalized output pattern was then multiplied by the annual values of the SIC output commodity from 1961 to 1996.

Some adjustments to the output pattern had to be made for commodities that were produced in the 1961 to 1996 period but not in 1997. The output pattern was modified to incorporate these commodities by assigning them a weight equivalent to the total output shares of each split. The use of the 1997 converted I-O tables resulted in a dynamic allocation process, where the commodity allocation corresponded logically to the structure of the NAICS industries. For some split industry vectors, such as aquaculture and veterinary services, the outputs and input structures were known and used thus replacing the conversion algorithm process for these split vectors**.**

Once the output commodities were converted to NAICS, they were added together for each NAICS industry and became the output control totals for the converted NAICS industries. These control totals also applied to total inputs (intermediate and primary), thus keeping the converted NAICS industries balanced. The information from the 1997 converted I-O Tables was also used to determine what portion of an input commodity of a given SIC industry corresponds to which NAICS industries. The allocated 1997 input commodities to NAICS industries formed the basis of an input pattern, which was also normalized. The normalized input pattern, however, differed from the output pattern in that the input pattern was normalized such that the sum of all input commodities (including GDP commodities) for a given converted NAICS industry was equal to 1.00.

The normalized input pattern, also referred to as the technology pattern, was then multiplied by the total output control totals of each converted NAICS industry derived from the output conversion. This resulted in converted NAICS industries from 1961 to 1996 that were both balanced and reflected the input to total output ratios of the NAICS industries in 1997. Although the NAICS industries were balanced, meaning that total inputs were equal to total outputs, the commodities were no longer balanced. This means that the sum, for a given input commodity of all the corresponding NAICS industries did not equal to the input commodity value of the SIC industry.

The use of a 1997 NAICS industry structure or technology pattern on SIC industries did pose a few difficulties, particularly in the early years. These difficulties were particularly acute when the SIC industries where made to resemble NAICS industries which have radically different technology patterns (meaning different input, including primary inputs to total output ratios). For example, the SIC industry covering services incidental to agriculture has a very different technology pattern than the NAICS industry for professional services, for which a component related to veterinary services had to be allocated. To reconcile the differences and keep the system in balance, a mathematical prorating technique known as the RAS method was used. With this method, it was possible to convert an SIC industry to resemble a number of different NAICS industries, while ensuring that the system remain in balance, for both inputs and outputs.

The final results of the conversion process were vigorously checked. Some of these checks included an analysis of the gross output and GDP growth rates, as well as ratio analysis for wages and other GDP components to total output. The evolution of certain ratios was also reviewed. For example, the ratio of supplementary labour income to wages and salaries evolved substantially from 1961 onwards. A verification was to ensure the story still holds in the backcasted series. In addition, a number of tests

were conducted to ensure that the converted SIC to NAICS tables were structurally sound from an input-output perspective.

A special table was prepared for clients. The table provided a complete list of the 119 NAICS-based historical link-level industries for total gross output. The table compared the results of allocating (forcing) an SIC industries to one and only one NAICS industry, to the results of mechanically converting SIC industries to (multiple) NAICS industries using the algorithmic conversion process. The table also shows the true NAICS values as estimated in the 1997 I-O tables for reference purposes. This table will allow users to see and compare the original discontinuities that were caused by forcing SIC industries to NAICS industries to the reduced (and sometimes completely eliminated) breaks as a result of using the algorithmic conversion process.

Conclusion

The CSNA has always put a lot of efforts into satisfying its clients who need long time series. The SIC-NAICS conversion project is no exception. The CSNA is in a much better position than its clients to do this sort of work. Providing a uniform time series to its clients reduced the risk of errors in economic analysis due to wrong aggregations of the basic data. However, industry statistics produced under the SIC remain easily available to users who want to build their own time series or to conduct structural analysis.

Contrary to the past, the CSNA has adopted an approach where the time series reflects the newest industry classification and its aggregation. In the past the time series were designed to be a hybrid of many classifications. The new approach has considerably helped reconciliation processes between the CSNA and other statistical programs in the Agency which are only NAICS driven. Also, the CSNA has learned a lot about the NAICS structure by building a concordance between the SIC and NAICS input-output tables for reference year 1997, helping putting in place more sound methodologies.

Most of the strategy was based on the fact that uniform commodity statistics were available from 1961. In a few years the CSNA will implement another new commodity classification, the North American Product Classification System (NAPCS). The CSNA will most likely face similar challenges as to the implementation of NAICS. The impact on the CSNA framework, notably the IO framework is unknown. Work has begun to produce concordances between several existing classifications such as those related to statistics on international trade, manufacturing or input-output tables. The amount of detail that will be available prior its implementation is currently unknown but the approach will be to produce a series that reflect the most current commodity structure as opposed to a hybrid one.

ILLUSTRATION OF THE MECHANICAL CONVERSION PROCESS

Example: Converting SIC W Industry 003- Service Industries Incidental to Agriculture into NAICS-based W industries.

Services incidental to agriculture, as defined by SIC W Industry 003 are found in several NAICS-based W industries. These include:

NAICS W Industry	Economic Activity or Type of Establishment Generating the Linkage
112A00	For poultry hatcheries
113000	For establishments primarily engaged in gathering berries, wild rice and wild ginseng in the bush.
115100	For most of support activities to crop production (there are too many activities to list here)
115200	For most of support activities to animal production (there are too many activities to list here)
541300	For establishment primarily engaged in soil and seed testing services
541B00	For establishments primarily engaged in agricultural consulting services, agricultural research and development and veterinary services.
561700	For establishments primarily engaged in ornamental shrub and tree planting and maintenance services
812A00	For establishments primarily engaged in providing grooming and boarding services for pets and domesticated animals.

Of the 8 linking NAICS-based W industries, four of them were deemed to be insignificant because the economic activities generating the linkage represent a small percentage of either the SIC W or the NAICS W industry. In the case of services incidental to agriculture, the linkages to NAICS W 112A00, 113000, 541300 and 561700 were deemed to be insignificant and no estimates were made for them.

Step 1 – Converting the Outputs

From the 1997 relationship between the SIC and NAICS, the following linking NAICS W industries were deemed to be significant with the following values:

Output Side

SIC W Industry 003 has two output commodity, 0231 – Services Incidental to Agriculture, and 5751 – Software Products Development

1997 SIC-based W Industry 003	Linking NAICS W Industries

IO W Commodities	Value	115100 Value	115200 Value	541B00 Value	812A00 Value	Total
0231- Services Incidental to Agriculture	1,538,775	207,340	266,520	889,226	175,689	1,538,775
5751 – Software Products Development	6,829	1,487	1,912	3,210	220	6,829
Total	**1,545,604**	**208,827**	**268,432**	**892,436**	**175,909**	**1,545,604**

The value of IO W commodity 0231 and 5751 for each linking NAICS industry are then normalised horizontally, such that the sum of each share is equal to one. This pattern is referred to as the Output Pattern.

SIC-based W Industry 003	Linking NAICS W Industries

IO W Commodities	Shares	115100 Shares	115200 Shares	541B00 Shares	812A00 Shares	Total
0231 Services Incidental to Agriculture	1.000	0.135	0.173	0.578	0.114	1.000
5751 Software Products Development	1.000	0.218	0.280	0.470	0.032	1.000

The normalized 1997 values of the linking NAICS industries are then multiplied by the SIC W values for commodities 0231 and 5751 for each year. The results for 1996 are shown below.

1996 SIC-based W Industry 003	Linking NAICS Industries

IO W Commodities	Value	115100 Value	115200 Value	541B00 Value	812A00 Value	Total
0231 Services Incidental to Agriculture	1,530,698	206,252	265,121	884,558	174,767	1,530,698
5751 Software Products Development	2,918	635	817	1,372	94	2,918
Total	**1,533,616**	**206,887**	**265,938**	**885,930**	**174,861**	**1,533,616**

Step 2 – Converting the GDP and Intermediate Inputs

From the 1997 relationship between the SIC and NAICS, the linking NAICS W industries had the following GDP at basic price and intermediate input values.

SIC-based W Industry 003	Linking NAICS W Industries

IO W Commodities	Value	115100 Value	115200 Value	541B00 Value	812A00 Value	Total
Intermediate inputs (too many commodities to list individually)	674,598	26,233	141,838	476,597	29,930	674,598
GDP at Basic Price Commodities						
5972 – Subsidies on Production	0	0	0	0	0	0
5980 – Indirect Taxes on Production	8,902	524	785	7,002	591	8,902
5990 – Wages and Salaries	577,556	126,227	74,298	264,022	113,009	577,556
6000 – Supplementary Labour Income	22,498	12,760	7,512	1,484	742	22,498
6010 – Mixed Income	229,437	38,700	37,217	125,414	28,106	229,437
6020 – Other Operating Surplus	25,784	2,896	4,870	14,707	3,311	25,784
Total	**1,538,775**	**207,340**	**266,520**	**889,226**	**175,689**	**1,538,775**

The input values of the linking NAICS W industries are then normalized vertically, such that the sum of

each share within a linking NAICS W industry is equal to one. This pattern is referred to as the Technology Pattern.

Technology Pattern	Linking NAICS W Industries			
	115100 Shares	115200 Shares	541B00 Shares	812A00 Shares
Intermediate inputs (too many commodities to list individually)	0.127	0.532	0.536	0.170
GDP at Basic Price Commodities				
5972 – Subsidies on Production	0.000	0.000	0.000	0.000
5980 – Indirect Taxes on Production	0.003	0.003	0.008	0.003
5990 – Wages and Salaries	0.609	0.279	0.297	0.643
6000 – Supplementary Labour Income	0.062	0.028	0.002	0.004
6010 – Mixed Income	0.187	0.140	0.141	0.160
6020 – Other Operating Surplus	0.014	0.018	0.017	0.019
Total	**1.000**	**1.000**	**1.000**	**1.000**

The Technology Pattern derived above is then multiplied by the outputs of the linking NAICS W industry derived in Step 1. The results for 1996 are shown below.

Derived intermediate inputs and GDP at basic prices for 1996	Linking NAICS W Industries				
	115100 Value	115200 Value	541B00 Value	812A00 Value	Total
Intermediate inputs (too many commodities to list individually) inputs	26,176	141,528	474,830	29,789	672,323
GDP at Basic Price Commodities					
5972 – Subsidies on Production	0	0	0	0	0
5980 – Indirect Taxes on Production	523	783	6,976	588	8,870
5990 – Wages and Salaries	125,951	74,136	263,043	112,476	575,607
6000 – Supplementary Labour Income	12,732	7,496	1,478	739	22,445
6010 – Mixed Income	38,615	37,136	124,949	27,974	228,674
6020 – Other Operating Surplus	2,890	4,859	14,652	3,295	25,697
Total	**206,887**	**265,938**	**885,930**	**174,861**	**1,533,616**

The results of the derived intermediate inputs and GDP at basic prices show that the sum of the inputs is equal to the sum of the outputs for each linking NAICS W industry. Although this satisfies the condition that the total inputs must equal the total outputs, the sum of the four linking NAICS W industries for each individual commodity does not equal the value of the commodity in the SIC W industry.

1996 Comparison:

Intermediate and GDP at Basic Price Commodities	SIC W INDUSTRY 003 Values	Total Value of the Linking NAICS W Industries	Differences
Intermediate inputs (too many commodities to list individually)	610,111	672,323	-62,212
GDP at Basic Price Commodities			
5972 – Subsidies on Production	-6	0	-6
5980 – Indirect Taxes on Production	10,092	8,870	1,222
5990 – Wages and Salaries	652,649	575,607	77,042
6000 – Supplementary Labour Income	4,271	22,445	-18,174
6010 – Mixed Income	225,101	228,674	-3,573
6020 – Other Operating Surplus	31,398	25,697	5,701
Total	**1,533,616**	**1,533,616**	**0**

The differences for each commodity between the values of the SIC W industry 003 and the sum of the four linking NAICS W industries must be eliminated. For the GDP at basic price commodities, the differences are allocated back to the linking NAICS W industries based on the relative shares of each commodity in each linking industry. For commodity 5972 - Subsidies on Production, because there were no values in 1997 (and hence no shares), the share values assigned is based on the total GDP at basic price shares.

Shares of the 1996 GDP at Basic Price Commodities	Linking NAICS W Industries				
	115100 Shares	115200 Shares	541B00 Shares	812A00 Shares	Total Shares
5972 - Subsidies on Production	0.210	0.144	0.477	0.168	1.000
5980 - Indirect Taxes on Production	0.059	0.088	0.786	0.066	1.000
5990 - Wages and Salaries	0.219	0.129	0.457	0.195	1.000
6000 - Supplementary Labour Income	0.567	0.334	0.066	0.033	1.000
6010 - Mixed Income	0.169	0.162	0.546	0.122	1.000
6020 - Other Operating Surplus	0.112	0.189	0.570	0.128	1.000

The differences of the GDP at basic price commodities are allocated back to the NAICS W industry linkages based on the shares derived above.

1996 Differences of GDP at Basic Price Commodities Allocated Back to the Linking NAICS W Industries	Linking NAICS W Industries				
	115100 Value	115200 Value	541B00 Value	812A00 Value	Total Value
5972 – Subsidies on Production	-1	-1	-3	-1	-6
5980 – Indirect Taxes on Production	72	108	961	81	1,222
5990 – Wages and Salaries	16,858	9,923	35,207	15,054	77,042
6000 – Supplementary Labour Income	-10,309	-6,069	-1,197	-598	-18,174
6010 – Mixed Income	-603	-580	-1,952	-437	-3,573
6020 – Other Operating Surplus	641	1,078	3,251	731	5,701
Total	**6,657**	**4,458**	**36,266**	**14,830**	**62,212**

The differences that were allocated back to the GDP at basic price commodities are added to the GDP at basic price commodities calculated initially by applying the technology pattern.

1996 Final Values of the GDP at Basic Price Commodities for Each Linking NAICS W Industries	Linking NAICS W Industries				
	115100 Value	115200 Value	541B00 Value	812A00 Value	Total Value
5972 – Subsidies on Production	-1	-1	-3	-1	-6
5980 – Indirect Taxes on Production	595	891	7,937	669	10,092
5990 – Wages and Salaries	142,809	84,085	298,251	127,531	652,649
6000 – Supplementary Labour Income	2,423	1,426	281	141	4,271
6010 – Mixed Income	38,012	36,556	122,997	27,536	225,101
6020 – Other Operating Surplus	3,531	5,937	17,903	4,027	31,398
Total	**187,369**	**128,868**	**447,366**	**159,902**	**923,505**

The final step in the mechanical conversion process is to modify the intermediate inputs such that the total input commodities (including the GDP at basic price commodities) add up to the total outputs as well as to the values of the SIC W Industry 003 commodities. To achieve both these constraints, the RAS method is used.

Fully Converted 1996 Intermediate Inputs and GDP Commodities at Basic Price	Linking NAICS W Industries				
	115100 Value	115200 Value	541B00 Value	812A00 Value	Total Value
Intermediate inputs (too many commodities to list individually)	19,519	137,070	438,564	14,958	610,111
GDP at Basic Price Commodities					
5972 – Subsidies on Production	-1	-1	-3	-1	-6
5980 – Indirect Taxes on Production	595	891	7,937	669	10,092
5990 – Wages and Salaries	142,809	84,085	298,251	127,531	652,649
6000 – Supplementary Labour Income	2,423	1,426	281	141	4,271
6010 – Mixed Income	38,012	36,556	122,997	27,536	225,101
6020 – Other Operating Surplus	3,531	5,937	17,903	4,027	31,398
Total	**206,887**	**265,938**	**885,930**	**174,861**	**1,533,616**

Fully Converted 1996 Outputs	Linking NAICS W Industries				
	115100 Value	115200 Value	541B00 Value	812A00 Value	Total Value
0231 – Services Incidental to Agriculture	206,252	265,121	884,558	174,767	1,530,698
5751 – Software Products Development	635	817	1,372	94	2,918
Total	**206,887**	**265,938**	**885,930**	**174,861**	**1,533,616**