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Digitalization

Measuring the digital economy: The Canadian digital supply and use tables 2017–2019

Prepared by Statistics Canada*

Summary

The Canadian Digital Supply and Use Tables (DSUTs) provide a comprehensive view of basic economic transactions related to the digital economy. The DSUTs disaggregate economic transactions in the standard Canadian Supply and Use Tables into their digital and non-digital components and provide a framework for analysing their relative roles in production and consumption activities over the 2017–2019 period. The paper also discusses compilation methods, including the indirect methods used to address several data gaps and notes outstanding challenges, especially in the areas of non-market output.

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I. Introduction

1. This paper presents preliminary figures on the digital economy in Canada for the period covering 2017 to 2019, based on the newly developed, experimental, Canadian digital Supply and Use Tables (SUTs). The digital SUTs disaggregate economic transactions in the standard Canadian SUTs into their digital and non-digital components and provide an integrated framework for analyzing their relative roles in production, consumption and international trade. These tables also allow the derivation of more granular indicators and analysis of the digital economy that are fully aligned with published national accounting figures.
2. The focus is primarily on measuring digital activities in the business sector. Digital activities in the education, health care and public administration sectors are not covered in this paper, mainly due to a lack of readily available data sources.
3. The rest of the document is organized in the following manner. Section II covers the data sources and methods used in the compilation of the digital SUTs and discusses some of the outstanding conceptual and measurement difficulties. Section III provides an overview of the empirical results and discusses some of the observed trends relative to the rest of the economy. The last section concludes with a discussion of some of the areas that would benefit from further enhancements.

II. Methods and data sources

4. The Canadian digital SUTs present enhanced details on digitally enabling infrastructure and the supply and uses of digitally ordered and digitally delivered goods and services. The methods are generally aligned with the OECD framework for measuring the digital economy through the compilation of extended supply and use tables. The paper focuses on expanding detail and increasing the visibility of transactions related to the digital economy but does not address issues that go beyond the current national accounts production boundary that are currently under discussion internationally such as the value of free services and data assets.
5. Figure 1 presents the basic structure of the digital supply table, abstracting from some details for presentation purposes. In the column dimension, the tables are reorganized to show further detail that distinguishes digital from non-digital industries as well as aggregate supplies and uses of digitally delivered and non-digitally delivered products.
6. For the row dimension, each product is split into its digitally-ordered and non-digitally ordered components. Digitally-ordered products are further broken down into separate categories for ordered direct from a counterparty, from a resident retailer or wholesaler, via a resident digital intermediary or via a non-resident digital intermediary. These items will be discussed in further detail in a subsequent section below.

Figure 1
Digital supply table

Product	Output		Total output, digital industries		Total output, non-digital industries		Imports		Total supply	
	Digital industries	Other industries	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products
Digitally ordered										
Direct from a counterparty										
From a resident retailer or wholesaler										
Via a resident digital intermediary										
Via a non-resident digital intermediary										
Non-digitally ordered										

7. The digital use table, in Figure 2, follows the same general logic as the digital supply table. The input table shows the intermediate consumption and value added of the digital and non-digital industries covered in the output table. Total inputs and final uses are split into digitally delivered and non-digitally delivered products. In the row dimension, the products are also split into digitally- and non-digitally ordered.

Figure 2
Digital supply table

Product	Input		Total input, digital industries		Total input, non-digital industries		Domestic final demand		Exports		Total use	
	Digital industries	Other industries	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products	Digitally delivered products	Non-digitally delivered products
Digitally ordered												
Direct from a counterparty												
From a resident retailer or wholesaler												
Via a resident digital intermediary												
Via a non-resident digital intermediary												
Non-digitally ordered												

A. Product classification

8. The SUTs product classification is adjusted to show two new products: Cloud computing and Platform intermediation. Both of these services require a disaggregation of market transactions already covered in the current SUTs.

9. For analytical purposes, products in the tables are reorganized under three categories: 1) digital products, 2) non-digital products significantly affected by digitalisation, and 3) other non-digital products. Digital products are further grouped under ICT goods, cloud computing, platform intermediation and other priced digital services, which cover the remaining ICT services. Annex A provides a detailed list of the SUTs products included in these categories.

B. General approach to estimation

10. The digital SUTs are not completely recompiled from source data with methods that replicate the production of the standard SUTs. Instead, data in the standard tables are simply disaggregated based on available indicators. Information from source data is used to allocate known elements and any remaining missing data are subsequently filled in based on simplifying assumptions. Thus, for example, while e-commerce surveys provide ample information on the proportions of digitally ordered outputs by industry, almost no relevant statistical information is available on the uses of digitally-ordered products. As a result, the uses of each digitally-ordered product are often based on a proportional allocation of outputs to all related use categories.

C. Data sources

11. The standard SUTs constitute the starting point for the digital measures. Estimates for 2017 rely on the latest available published benchmark SUTs. For 2018 and 2019 advance estimates of the Canadian SUTs were modelled based on industry indicators of output and gross value added that were benchmarked to published income- and expenditure-based GDP figures.

12. The measurement of digital activities relied on integrating information from a combination of survey, tax, administrative, corporation annual reports, and even some private sector data providers. These sources of information are briefly discussed below.

13. Digitally-ordered transactions are derived mainly from e-commerce revenues captured on annual establishment-based business surveys such as the Annual Retail Trade Survey and the Annual Survey of Manufacturing and Logging Industries. These measures were complemented by information from the 2019 enterprise-based economy-wide business survey, the Survey of Digital Technology and Internet Use.

14. There is very limited statistical information on digitally-delivered transactions. The only source data available was from the “Digital delivery of services” module on the business survey on International Transactions in Commercial Services. In the absence of other source information, the characteristics of the products in the SUTs were used to determine the value of digitally-delivered services.

15. An important source of information for the activities of producers that operate only digitally were corporate tax records, which report the shares of internet sales. The revenues of firms that reported a dominant proportion of their sales as internet-based were used to split industry outputs and inputs into their digital and non-digital components.

16. Tracking the activities of platform intermediaries required the use of multiple data sources including annual reports and the tax records of both the incorporated and unincorporated units operating in the taxi, delivery and accommodation industries, as well as statistics from private sector data providers for the accommodation sector.

17. Customs data as well as value-added tax remittances by non-residents were used to derive the online purchases from non-residents. Customs data on low-valued courier shipments, which have been growing very rapidly in recent years, were considered to be a good indicator of online purchases from non-residents.

D. Methodology for estimating the digital industries

18. Digital industries cover two types of firms: digitally-enabling firms and firms that rely on online presence for their revenues. The first are involved in producing the infrastructure required for digital activities in general. The second rely on their online presence to generate advertising or other traffic-related revenues or on online sales for the majority of their revenues.

19. The definition of digitally enabling industries aligns with current industry classifications.

20. Therefore, relevant industry detail is readily available from the standard SUTs. E-commerce sales or online presence, however, is not a defining characteristic of current industrial classifications outside the retail and wholesale sectors. Annual business surveys, used to populate the standard SUTs, are currently not stratified in a manner that allows separately delimiting the activities of these units which have a presence across a large number of non-retail industrial sectors.

21. The OECD framework organizes digital economy firms into 7 industry groups. Definitions and measurement methods are discussed below.

1. Digitally enabling

22. The digitally enabling industries classification lines up with the commonly used definition of ‘Information and Communication Technologies’ (ICT) industries. It includes computer and electronic equipment manufacturing, wholesaling, and repairs, telecommunications, and software production industries. The detailed list of industries that define this sector are provided in Annex B.

23. This group of industries is simply mapped from the standard Canadian SUTs with the exception of wholesaling and repairs. For these latter two industries aggregate levels had to be split based on allocation factors from the more detailed original source survey data.

2. Data and advertising driven digital platforms

24. Data and advertising driven digital platforms include firms that generally provide free online services to attract users but rely on their online presence to generate advertising revenues or to sell traffic and user data. The industry estimates are based on a number of firms classified to the advertising industry that reported mostly online revenues. A number of online firms that would qualify for this heading are currently classified to the ICT industries under “Data processing and hosting services”; their heavy information technology footprint and hosting activities appear to heavily influence their classification. No special effort was made to reallocate these firms as they would still be captured under the general digital economy aggregates.

25. Data driven digital platforms are dominated by large global firms. No evidence was found of Canadian firms involved in selling user data as their main source of revenues.

3. Digital intermediary platforms charging a fee

26. The OECD defines an online platform as “a digital service that facilitates interactions between two or more distinct but interdependent sets of users (whether firms or individuals) who interact through the service via the Internet” (OECD, WTO and IMF 2020). These platforms charge fees for their services, even though they may still derive secondary revenues from selling user data or advertising services. Most of the activity is dominated by a few large firms in taxi, delivery and short-term accommodation. Firm level data was used to construct the industry estimates for domestic platforms, including publicly available annual reports and tax filings.

4. Firms dependent on intermediary platforms

27. This category includes all producers that rely on intermediary platforms for the majority of their revenues. It is separated into two distinct industries covering the incorporated and the unincorporated units. The corporate sector includes a relatively smaller number of firms with larger average revenues. The unincorporated sector is made up of a large number of mostly small household producers.

28. Firm-level tax data was used to split the taxi and local messenger and delivery industries into their traditional and platform-dependent portions. A particular difficulty was faced in estimating the secondary outputs of industries such as the platform-related delivery revenues of traditional taxi drivers. Secondary output was residually derived as the difference between resident platform revenues and the fees generated from producers whose main revenues rely on platforms. However, no such methods could be applied to non-resident intermediary platforms.

29. Estimates in the accommodation sector relied on information from private sector data providers¹. Accommodation survey data as well as tax records of lessors of residential real estate did not yield any usable information on short term rental activity related to platforms. One possibility is that tax filers continue to report their short term rental revenues under residential real estate income, making it difficult to separately delineate this new type of activity.

5. E-Tailers

30. E-tailers covers the retail and wholesale units that rely on e-commerce for the majority of their sales. Estimates for these industries are available from the Annual Wholesale Trade Survey, captured under the “Business-to-business electronic markets” industry and the Annual Retail Trade Survey, under “Electronic shopping and mail-order houses”. However, further research is needed to determine the extent to which online-only retailers may still be classified under the brick and mortar retailing industries.

6. Digital only firms providing financial and insurance services

31. Unlike other categories, which focus on the preponderance of e-commerce activities, this industry covers units that are exclusively online. Units that have a client-facing brick and mortar presence are excluded. Delineating e-commerce sales in this sector is quite challenging as most day-to-day interactions with consumers are now digital in nature. Firm level data from regulatory and tax filings were used to derive the estimates for this industry.

7. Other producers only operating digitally

32. Other producers only operating digitally is a residual category encompassing all other units operating digitally that are not specified elsewhere. For practical reasons, the units classified here are not required to generate 100% of their revenues from online activities but rather a large majority of their revenues is deemed a sufficient condition.

33. Some goods producers that reported a large proportion of e-commerce sales were excluded from this category. These are units that were not deemed to be truly reliant on e-

¹ See Statistics Canada (2019) for further details.

commerce for their activities and their inclusion would not have provided analytically useful results for the relative role of digitalization in the economy.

E. Methods for estimating digitally ordered products

34. Digitally-ordered products refers to e-commerce transactions that occur over the internet. This covers orders made through web pages, extranet or Electronic Data Interchange (EDI), including third-party websites and apps. This category is separated into four distinct types of ordering: directly from a producer, a domestic distributor, a resident intermediary platform or a non- resident intermediary platform.

1. Ordered direct from a counterparty

35. Products ordered direct from a counterparty covers goods and services that are ordered over the internet directly from a domestic producer or that are directly imported by the consumer from non-resident producer or distributor. It excludes sales made by domestic wholesalers and retailers or through digital intermediary platforms all of which are shown separately.

36. Outputs of digitally-ordered products were derived mainly from e-commerce revenues captured on annual establishment-based business surveys. These estimates were confronted and complemented by estimates from the 2019 Survey of Digital Technology and Internet Use, which were also trended back to 2018 and 2017 based on general observed trends in the annual surveys. The digitally-ordered outputs derived in this step were proportionally allocated to use categories.

37. Digitally-ordered imports of goods were based on a combination of merchandise trade data on small-valued couriered items as well as the value-added tax remittances by some know large non-resident retail platforms. This represents a lower bound for digitally-ordered imports of goods and some further research here is needed to at least approximate an estimate for other categories of digitally ordered imports. The values of these digitally-ordered imports were proportionally allocated to domestic use categories. However, despite the absence of any empirical measures, a larger portion of these purchases were arbitrarily allocated to the household sector which was deemed to be more likely to be involved in these types of small-valued and retail platform-based transactions.

38. Information on digitally-delivered products from the Business Survey on Exports of Commercial Services were used to model estimates for both the imports and exports of digitally ordered services. Analysis of the survey results clearly indicated that a large proportion of the digitally-delivered exports were at the same time digitally-ordered as they represented activities such as online gambling and online games. Imports of these services were proportionally added to domestic uses.

39. For exports, possible overlap of digitally-ordered products with the output-based figures had to be taken into consideration. Export values were allocated to domestic output where direct measures of digitally-ordered output were missing. Alternatively, other use categories were adjusted as an offset to the export figures where direct measures of digitally-ordered output were already available.

2. Ordered from a domestic wholesaler or retailer

40. This category captures the value of e-commerce sales by domestic distributors². As distinct from the digital intermediary platforms which charge fees for their services, wholesalers and retailers take ownership of the products they resell.

41. In the SUTs, the outputs of the retail and wholesale industries cover only their margin activity and not the value of their gross sales. The products being distributed are treated

² The two categories “Ordered directly from a producer” and “Ordered directly from a domestic wholesaler or retailer” are presented in the OECD framework as one single category “Ordered directly from a counterparty”.

instead as directly purchased by consumers from the industries producing them or from non-residents as imports.

42. The SUTs treatment of margins presents a problem for tracking the value of digitally-ordered sales and purchases. If only the digitally-ordered margin values are shown then the non-margin portion of the gross sales of digitally ordered products by wholesalers and retailers remains missing from the tables. At the same time, any products digitally ordered by distributors would appear as an e-commerce revenue by the producing industries without an equivalent purchase and would have to be allocated arbitrarily to the ultimate consumers to maintain the supply-use equilibrium.

43. An alternate presentation, adopted by the Canadian digital SUTs, shows the full value of digitally-ordered purchases from distributors. However, with this method the equivalent supply of the non-margin value has to be allocated to domestic industries producing the products and to imports. These transactions are shown under “Digitally ordered from domestic retailers or wholesalers” to allow separately tracking these activities.

44. One of the difficulties with presenting the total value of the digitally-ordered purchases is the overlap between wholesaling and retailing of the same product in the use table. For the Canadian digital SUTs, retail gross sales are reported for digitally-ordered household final consumption expenditures, whereas wholesale gross sales are used for industry inputs, fixed capital formation and exports.

45. A numerical example of the treatment of digitally-ordered margins is provided in Table 1. In the base case scenario A, the supply side has a clothing manufacturer with 200 in sales, 20 of which are from e-commerce sales to the retailer and the output of the retail industry (50) is entirely from e-commerce sales. On the demand side, final consumption expenditure on clothing (150) is entirely digitally ordered and exports (100) are non-digitally ordered. Scenarios B and C present two possible treatments for these transactions.

46. Under scenario B, only the retail margin value is considered digitally ordered (50). Final consumption expenditures have to show the demand for the margin (50) but cannot show the full value of the digitally-ordered product. Also, in the absence of a retail industry demand for the digitally-ordered manufacturing output (20), the latter has to be allocated to the other use categories or eliminated to maintain the supply-use equilibrium.

47. Practically though, most of the data sources on digitally ordered transactions are from industry revenues; in the absence of information on the demand-side of the ledger, it is impossible to determine whether the demand from the manufacturer was by the retailer or if it was directly purchased by another use category such as final consumption or exports.

48. Finally, scenario C, which was adopted for the Canadian digital SUTs, presents a version where the full value of the digitally ordered product is shown in final consumption as a retail margin of 50 plus manufacturing of 100. This requires showing the non-margin supply of the product as digitally ordered under manufacturing output (100). However, as in scenario B, the uses of digitally-ordered revenues reported by the manufacturer (20) remain unknown and are arbitrarily allocated to use categories based on proportionality.

Table 1
Retail margin output and digitally ordered purchases

	Output		Use	
	Clothing manufacturing	Retail industry	Final consumption expenditures	Exports
<i>Scenario A: assumed transactions</i>				
Total	200	50	150	100
Digitally ordered	20	50	150	
<i>Scenario B: Only the margin output is digitally ordered</i>				
Digitally ordered - retail		50	50	
Digitally ordered - manufacturing	20		10	10
<i>Scenario C: The purchase value is digitally ordered</i>				
Digitally ordered - retail		50	50	
Digitally ordered - manufacturing	20+100		10+100	10

49. E-commerce modules from the wholesale and retail industry surveys are used to derive the proportion of digitally-ordered retail and wholesale margin output in the SUTs. Margin output values are subsequently grossed up by the survey sales-to-margin ratio to derive the gross value of e-commerce sales in the SUTs. Total gross sales by product are allocated to demand based on the valuation tables and to domestic output and imports based on the relative shares of these two sources of supply.

50. However, as noted earlier, gross wholesale sales overlap with the gross retail sales of the same product and thus the overall figures in the digital SUTs for this category will be lower than the overall total survey-based estimates.

3. Ordered via a digital intermediary platform

51. Transactions through digital intermediary platforms are shown separately for resident and non-resident platforms. Both the fees charged by the platforms for their services as well as the products being transacted through the platforms are recorded under this item.

52. Fees paid to non-resident platforms are measured indirectly, as a proportion of the revenues generated by domestic producers using the platform.

F. Methods for estimating digitally delivered products

53. Digitally delivered products are defined based on the Handbook on Measuring Digital Trade which delineates them as “transactions that are delivered remotely over ICT networks – i.e. over voice or data networks, including the internet, in an electronically downloadable format” (OECD, WTO and IMF 2020).

54. E-commerce modules on business surveys do not provide information on revenues by mode of delivery. A single exception is provided by the Business Survey on Exports of Commercial Services. The proportion by product of digitally-delivered services from the survey are applied to both exports and imports in the SUTs. Digitally-delivered exports are proportionally allocated to producing industries to derive the associated outputs. Similarly, digitally-delivered imports are proportionally allocated to domestic uses to derive the equivalent demand.

55. In the absence of any other source data, the trade-based estimates are complemented by an approach that relies on the characteristics of the products in the SUTs. The list of these products is provided in Annex C.

III. The Canadian digital SUTs, 2017–2019

56. Table 2 shows some aggregate results from the digital supply table for 2019. The digital industries accounted for 5.0% (\$205 billion) of total output. Digitally-ordered products represented 6.8% (\$336 billion) of total supply and digitally delivered services represented 2.3% (\$116 billion) of total supply.

57. Most digitally ordered products (71%) were sourced directly from the supplier, whereas 27% were purchased through domestic retailers and wholesalers. Digital intermediary platforms were responsible for the remaining 2%, with non-resident platforms dominating activity relative to domestic platforms.

58. Approximately 7.2% of imports (\$52 billion) were digitally ordered which slightly exceeded the share of digitally ordered from domestic producers, 6.8% (\$278 billion).

59. The digital industries provided 79% of the domestic supply of digitally delivered products. The share of digitally delivered products in domestic production (2.4%) was higher than its share in imports (1.8%).

Table 2

Digital Supply table, totals, 2019

Transaction type	Output, Total digital industries	Output, Total digital industries, digitally delivered	Total output	Total output, industries, digitally delivered	Imports	Imports, digitally delivered	Taxes on products	Total supply at purchasers' prices	Total supply at purchasers' prices, digitally delivered
millions of dollars									
Total	204,768	76,461	4,065,386	96,580	722,624	13,236	173,179	4,961,189	115,527
Digitally ordered	73,953	50,362	277,933	65,665	51,723	9,144	6,696	336,352	75,019
Direct from a counterparty	59,612	49,658	218,757	64,961	19,588	8,559	1,072	239,416	73,659
Via a resident digital intermediary	1,193	704	1,193	704	0	0	0	1,193	704
Via a non-resident digital intermediary	3,839	0	3,839	0	984	584	70	4,893	606
Via a resident retailer or wholesaler	9,308	0	54,144	0	31,150	0	5,555	90,849	50
Not digitally ordered	130,815	26,098	3,787,453	30,915	670,902	4,092	166,483	4,624,837	40,508

Source: Statistics Canada, *Digital Supply and Use Tables, 2019*.

60. Aggregate figures from the 2019 digital use table are presented in Table 3. Households accounted for approximately 30% of digitally ordered products while industry purchases, including exports covered the rest. The digital industries had the highest proportion of digitally ordered purchases at 14%; for other industries, households, and exports this proportion hovered around 8%.

Table 3

Digital Use table, totals, 2019

Transaction type	Input, Total digital industries	Total Input	Final consumption expenditures, households	Final consumption expenditures, government and NPISH	Gross capital formation	Exports	Exports, digitally delivered	Total Use
millions of dollars								
Total products	87,424	1,927,518	1,247,894	516,925	531,352	737,500	17,053	4,961,189
Digitally ordered	12,115	165,910	99,273	0	15,061	56,107	13,582	336,352
Direct from a counterparty	10,813	125,805	65,655	0	10,118	37,839	13,511	239,416
Via a resident digital intermediary	56	896	159	0	0	138	63	1,193
Via a non-resident digital intermediary	238	2,829	922	0	0	1,142	0	4,893
From a resident retailer or wholesaler	1,008	36,381	32,537	0	4,944	16,987	8	90,849
Not digitally ordered	75,309	1,761,607	1,148,621	516,925	516,291	681,393	3,471	4,624,837
Subsidies on products	-444	-19,040						
Gross value added	117,788	2,039,564						

Source: Statistics Canada, *Digital Supply and Use Tables, 2019*.

61. Digital industries relied on direct purchases from a counterparty for 89% of their digitally ordered products. Most e-commerce sales by domestic wholesalers and retailers,

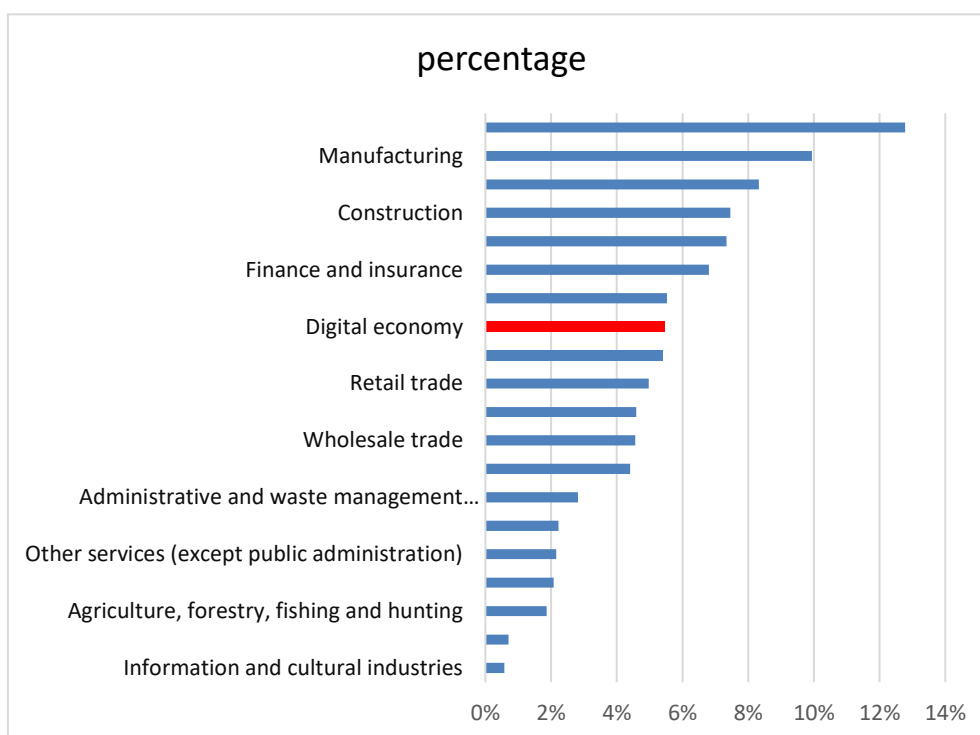
39%, were aimed at non-digital industries, households accounted for 36% and exports for 19%.

62. Digital delivery covered 2.3% (\$17 billion) of total exports. Most digitally-delivered products (80%) were digitally ordered.

63. At 5.5% (\$118 billion) of Canadian GDP in 2019, the digital economy ranked slightly below mining, quarrying and oil and gas extraction (\$119 billion) in relative size (Chart 1). It was slightly above educational services (\$117 billion).

Chart 1

Industry shares of GDP, 2019



Source: Statistics Canada, *Digital Supply and Use Tables, 2019*

64. As shown in Table 3, the contribution of the digital economy to total GDP trended up from 5.2% (\$103 billion) in 2017 to 5.4% (\$111 billion) in 2018, and 5.5% (\$118 billion) in 2019. The share of the sector in overall jobs also followed a similar trend increasing from 4.3% (772,000) of total jobs in 2017 to 4.8% (882,000) in 2019.

65. The digitally-enabling industries, traditionally referred to as the information and communication technology sector, dominated production in the digital industries, contributing to 4.8% of GDP in 2019. E-tailers, digital only firms providing financial and insurance services, and intermediary platforms ranked next in contributions, respectively at .24%, .16%, and .15% of GDP.

66. The contributions to jobs differed slightly from the contribution to GDP among the digital industries. The digitally-enabling industries contributed 88.5% of the GDP of the digital sector but a noticeably lower 76.7% of jobs in 2019. This was driven mainly by the telecommunications industry which made a lower contribution to jobs than to GDP and conversely by the digital intermediaries and e-tailers which made a larger contribution to jobs than to GDP. The differing contributions can be seen through the large disparities in the GDP to jobs ratio of these industries, which ranged from \$299,000 in telecommunications, to \$84,000 among e-tailers and a low of \$22,000 among unincorporated producers dependent on digital intermediaries.

Table 4
Digital industries GDP and jobs, 2017–2019

	Digitally enabling industries				Digital intermediary platforms			Data and advertising driven digital platforms	E-Tailers	Digital only firms providing finance and insurance services	Other producers only operating digitally	Total digital industries	Total, all industries
	Hardware	Software	Telecommunications	Other services	Digital intermediary platforms charging a fee	Dependent on intermediary platforms, Incorporated	Dependent on intermediary platforms, Unincorporated						
Year													
	GDP, in millions of dollars												
2017	6,536	41,891	36,166	9,912	60	1,015	653	835	3,748	2,340	448	103,298	1,991,534
2018	7,012	45,726	37,175	10,669	207	1,117	1,050	846	4,248	2,752	582	111,384	2,079,869
2019	7,243	48,013	37,460	11,511	327	1,399	1,458	979	5,187	3,392	821	117,788	2,157,352
	thousands of jobs												
2017	54	347	130	83	1	16	52	10	52	19	9	772	18,045
2018	55	377	130	85	2	17	61	10	55	21	12	825	18,241
2019	58	405	125	89	3	21	67	12	62	25	16	882	18,562

Sources: Statistics Canada, *Digital Supply and Use Tables, 2017, 2018, 2019*.

67. Digital products and non-digital products impacted by digitalization represented 8.1% of total uses in 2019, up by 1.3 percentage points from 2017. Digital products were mainly composed of priced digital services such as telecommunications and software as well as ICT goods. Cloud computing represented 3.3% of digital service purchases in 2019. Digitally intermediary services were still relatively small but had more than tripled over the three year period to reach \$1.8 billion in 2019.

Table 5
Use of digital products, 2017 and 2019

Product type	Total intermediate consumption	Final consumption expenditures, households	Final consumption expenditures, government and NPISH	Gross capital formation	Exports	Total Use
millions of dollars						
2017						
Total products	1,779,179	1,160,794	475,100	503,317	673,325	4,591,714
Digital products	93,982	44,903	0	49,433	26,916	215,234
Information and communication technology, goods	21,723	14,085	0	20,057	13,215	69,080
Priced digital services	68,241	30,211	0	27,847	12,772	139,070
Cloud computing	3,626	436	0	1,529	913	6,505
Digital intermediary services	392	171	0	0	17	579
Non-digital products, impacted	253,057	224,725	89,207	59	46,383	613,432
Other products	1,432,140	891,166	385,893	453,825	600,026	3,763,049
2019						
Total products	1,927,518	1,247,894	516,925	531,352	737,500	4,961,189
Digital products	103,806	47,333	0	53,381	31,251	235,770
Information and communication technology, goods	23,796	14,478	0	22,468	13,833	74,575
Priced digital services	74,413	32,037	0	28,797	16,344	151,592
Cloud computing	4,256	445	0	2,116	999	7,815
Digital intermediary services	1,340	373	0	0	75	1,789
Non-digital products, impacted	270,546	239,744	96,283	6	53,239	659,818
Other products	1,553,165	960,818	420,642	477,965	653,011	4,065,600

Source: Statistics Canada, *Digital Supply and Use Tables, 2017 and 2019*.

68. In 2019, the digital economy made the largest contributions to the economies of Ontario (6.8%), Quebec (5.6%) and British Columbia (5.0%). Its lowest presence was in Nunavut (2.5%), Newfoundland and Labrador (3.0%), and Saskatchewan (3.0%).

69. Between 2017 and 2019, the share of the digital economy in provincial GDP progressed in most provinces and territories with the exception of Newfoundland and Labrador where it remained stable and Prince Edward Island and Nunavut where it regressed.

Table 6
Digital economy GDP shares by province and territory, 2017–2019

	2017	2018	2019
	percentage		
Newfoundland and Labrador	3.0	3.0	3.0
Prince Edward Island	4.1	4.2	4.0
Nova Scotia	4.8	4.9	4.9
New Brunswick	4.1	4.3	4.3
Quebec	5.5	5.6	5.6
Ontario	6.4	6.6	6.8
Manitoba	3.4	3.5	3.6
Saskatchewan	2.8	2.9	3.0
Alberta	3.7	3.9	3.9
British Columbia	4.9	5.0	5.0
Yukon	4.1	4.3	4.1
Northwest Territories	3.2	3.3	3.3
Nunavut	2.7	2.7	2.5
Canada	5.2	5.4	5.5

Source: Statistics Canada, *Digital Supply and Use Tables, 2017, 2018, 2019 and table 36-10-0402-01*.

70. In 2019, 82% (723,000) of digital economy jobs were concentrated in Ontario, Quebec and British Columbia. These were also the provinces that had the highest proportions of digital economy jobs: Ontario (5.4%), Quebec (4.7%), and British Columbia (4.4%). The lowest proportions were in Nunavut (1.2%), Northwest Territories (1.9%) and Newfoundland and Labrador (2.3%). Software production in Ontario and Quebec alone accounted for 305,000 jobs.

Table 7
Digital economy jobs by province and territory, 2019

	Information and communication technology				Digital intermediary platforms	Data and advertising driven digital platforms	Online retailers and wholesalers	firms providing finance and insurance services	Other producers only operating digitally	Total digital industries	Total all industries
	Hardware	Software	Telecommunications	Other services							
	thousands of jobs										
Newfoundland and Labrador	0.1	1.2	1.4	0.7	1.0	0	0.4	0.2	0.1	5.2	221.1
Prince Edward Island	0.1	0.9	0.2	0.2	0.3	0	0.2	0	0	2.1	76.9
Nova Scotia	1.0	5.7	3.2	1.7	2.4	0.2	1.7	0.4	0.3	16.7	471.9
New Brunswick	0.4	4.5	2.8	1.3	1.4	0.0	0.8	0.3	0.2	11.8	358.4
Quebec	15.6	101.8	27.0	18.3	19.5	1.9	9.9	4.2	3.5	201.7	4,329.1
Ontario	29.7	203.3	48.7	34.8	36.0	7.2	28.4	13.1	6.5	407.8	7,610.5
Manitoba	0.5	5.1	5.7	2.5	3.0	0.1	2.0	0.6	0.5	20.0	687.8
Saskatchewan	0.8	3.6	6.6	3.4	2.6	0.1	1.9	0.6	0.4	20.0	602.9
Alberta	3.2	29.7	11.2	15.5	11.0	0.6	6.3	2.6	1.5	81.6	2,413.4
British Columbia	6.3	48.8	18.0	10.1	13.5	1.5	9.8	2.7	2.8	113.5	2,589.8
Yukon	0	0.1	0.4	0	0.2	0	0	0	0	0.8	27.0
Northwest Territories	0	0	0.2	0.1	0.1	0	0	0	0	0.5	25.9
Nunavut	0	0	0	0.1	0.1	0	0	0	0	0.2	19.0
Canada	57.8	404.7	125.4	88.7	91.1	11.7	61.7	24.8	15.8	881.8	19,443.5

Sources: Statistics Canada, *Digital Supply and Use Tables, 2019 and table 36-10-0480-01*.

71. The digitally enabling industries made the largest contribution to digital economy jobs in Ontario, Quebec and British Columbia. Software production in Ontario, Quebec and British Columbia combined accounted for 40.1% of all digital economy jobs in the country in 2019, a slight increase from 39.2% in 2017. Hardware production, telecommunications, and other services in the digitally enabling industries saw positive growth in some provinces and negative growth in others.

IV. Concluding remarks

72. The Canadian digital SUTs for 2017 to 2019 are simply an exploratory step in the development of digital economy measures. Estimates will be revised as compilation methods get refined and additional data sources are explored or developed. Additional revisions will also result from the incorporation of the benchmark SUTs for 2018 and 2019, which are released with a 3-year lag from the reference period.

73. Two areas of weakness also require further attention. First, a better differentiation is required of the production functions of digital and non-digital units in industries outside the digitally-enabling sector. The assumption of similar industry production functions among these units is overly simplistic and is likely smoothing away very divergent dynamics. The second area of difficulty is the absence of measures of digital activities in both the market and non-market output of public administration, education and health. In Canada, these sectors represent around one fifth of the economy and are also subject to substantial developments in the digital sphere. Examples of these latter developments were amply demonstrated during the pandemic as public and para-public institutions capitalized on digitalization to deliver services while minimizing in-person contact and the need for domestic and international travel.

Annex I

Digital products and non-digital products significantly affected by digitalisation

1. The Canadian SUTs are based on the Supply and Use Product Classification (SUPC) system, a variant of the North American Product Classification System (NAPCS). Some products appear twice as they were partially allocated to two different categories.

<i>SUPC Code</i>	<i>Title</i>
<i>Information and Communication Technology, goods</i>	
MPG334100	Computers, computer peripherals and parts
MPG334201	Telephone apparatus
MPG334209	Other communications equipment
MPG334401	Printed and integrated circuits, semiconductors and printed circuit assemblies
MPG334409	Other electronic components
MPG334A01	Audio and video equipment and unrecorded media
MPG339903	Toys and games
<i>Priced digital services except cloud and digital intermediaries</i>	
IMS541502	Own-account software design and development services
MPS511200	General purpose software
MPS517001	Fixed telecommunications services (except Internet access)
MPS517002	Mobile telecommunications services
MPS517004	Fixed Internet access services
MPS518000	Data processing, hosting, and related services (except software as a service, on cloud)
MPS541501	Custom software design and development services
MPS541503	Computer systems design and related services (except software development)
<i>Cloud computing</i>	
MPS511200	General purpose software
MPS518000	Data processing, hosting, and related services (except software as a service, on cloud)
<i>Digital intermediary services</i>	
MPS485300	Taxi and limousine services
MPS492000	Courier, parcel, and local messenger and delivery services
MPS721100	Room or unit accommodation services for travellers
<i>Non-digital products significantly affected by digitalisation</i>	
MPS482001	Rail passenger transportation services
MPS482002	Rail freight transportation services
MPS484001	Moving services

<i>SUPC Code</i>	<i>Title</i>
MPS484004	Road transportation services for general freight
MPS484005	Road transportation services for specialized freight
MPS485100	Urban transit services
MPS485300	Taxi and limousine services
MPS486200	Transportation of natural gas by pipeline
MPS486A00	Transportation of crude oil and other commodities by pipeline
MPS48A001	Interurban and rural bus passenger transportation services
MPS48A002	School bus services
MPS48A003	Other transit and passenger transportation services by road
MPS48A004	Scenic and sightseeing tour services
MPS721100	Room or unit accommodation services for travellers
MPS721A01	Recreational vehicle park and recreational camp services
MPS721A02	Rooming and boarding services
MPS722001	Prepared meals
MPS722002	Alcoholic beverages for immediate consumption
MPG511111	Newspapers
MPG5111A1	Periodicals
MPG5111A2	Books
MPG5111A3	Other published products
MPS511112	Advertising space in printed newspapers
MPS5111A4	Advertising space in printed periodicals and in other printed publications
MPS51AX00	Licensing of rights for commercial use of literary works (except software) and artistic works
MPS512130	Admissions to motion picture film exhibitions
MPS5121A1	Recorded movies, television programs and videos
MPS5121A2	Movie, television program and video production, post-production and editing services
MPS5121A3	Licensing of rights for commercial use of dramatic works, and other copyrighted property n.e.c.
MPS512201	Recorded music and other sound recordings
MPS512202	Audio recording services and copyright administration
MPS512203	Licensing of rights for commercial use of musical works and sound recordings
IMS551001	Holding company services (imputed)
MPS521000	Central banking services
MPS522130	Local credit union services – explicit charges (fees)
MPS5221A0	Banking and other depository credit intermediation services – explicit charges
MPS522200	Non-depository credit intermediation services – explicit charges (fees)

<i>SUPC Code</i>	<i>Title</i>
MPS522300	Other services related to credit intermediation
MPS523001	Investment banking services
MPS523004	Investment counselling services
MPS523009	Holding company services and other financial investment and related activities
MPS526A00	Mutual funds (cost of service) and other similar services
MPS52X001	Deposit intermediation services indirectly measured (FISIM)
MPS52X002	Residential mortgage intermediation services indirectly measured (FISIM)
MPS52X003	Other loan intermediation services indirectly measured (FISIM)
MPS524101	Life insurance services
MPS524102	Health and accident insurance services
MPS524103	Vehicle insurance services
MPS524104	Property insurance services
MPS524105	Liability and other property and casualty insurance services
MPS524200	Insurance brokerage and other services related to insurance
MPS526111	Trusted pension fund services
MPS523002	Security brokerage and securities dealing services
MPS523003	Portfolio management services
MPS541800	Advertising, public relations, and related services
MPS561500	Travel arrangement, reservation and planning services
MPS610001	Tuition and similar fees for elementary and secondary schools
MPS610002	Tuition and similar fees for colleges and C.E.G.E.P.s
MPS610003	Tuition and similar fees for universities
MPS610004	Tuition and similar fees for trade, technical and professional training
MPS610009	Other educational training and services
NGS611100	Elementary and secondary school services provided by governments
NGS611200	Community college and C.E.G.E.P services provided by governments
NGS611300	University services provided by governments
NGS611A00	Other educational services provided by governments
NNP610000	Educational services provided by Non-Profit Institutions Serving Households
MPS713200	Gambling (net wagers)

Annex II

Information and Communication Technology (ICT) Industries

1. The Canadian SUTs are based on the Input-Output Industry Classification (IOIC) system, a variant of the North American Industrial Classification System (NAICS). Some industries are partially allocated to the ICT sector.

<i>IOIC Code</i>	<i>Title</i>	<i>Partial allocation</i>
BS334100	Computer and peripheral equipment manufacturing	
BS334200	Communications equipment manufacturing	
BS334A00	Other electronic product manufacturing	
BS334400	Semiconductor and other electronic component manufacturing	
BS417000	Machinery, equipment and supplies merchant wholesalers	Partial
BS511200	Software publishers	
BS517000	Telecommunications	
BS518000	Data processing, hosting, and related services	
BS541500	Computer systems design and related services	
BS811A00	Repair and maintenance (except automotive)	Partial

Annex III

Digitally-delivered products

<i>SUPC Code</i>	<i>Title</i>
<i>Priced digital services except cloud and digital intermediaries</i>	
MPS511200	General purpose software
MPS517001	Fixed telecommunications services (except Internet access)
MPS517002	Mobile telecommunications services
MPS517004	Fixed Internet access services
MPS518000	Data processing, hosting, and related services (except software as a service, on cloud)
<i>Cloud computing</i>	
MPS511200	General purpose software
MPS518000	Data processing, hosting, and related services (except software as a service, on cloud)
<i>Digital intermediary services</i>	
MPS485300	Taxi and limousine services
MPS492000	Courier, parcel, and local messenger and delivery services
MPS721100	Room or unit accommodation services for travellers
<i>Non-digital products significantly affected by digitalisation</i>	
MPG511111	Newspapers
MPG5111A1	Periodicals
MPG5111A2	Books
MPG5111A3	Other published products
MPS5121A1	Recorded movies, television programs and videos
MPS512201	Recorded music and other sound recordings
MPS522130	Local credit union services – explicit charges (fees)
MPS5221A0	Banking and other depository credit intermediation services – explicit charges
MPS541800	Advertising, public relations, and related services
MPS561500	Travel arrangement, reservation and planning services
MPS713200	Gambling (net wagers)
<i>Other products</i>	
MPS519002	Internet advertising
MPS541100	Legal services
MPS541200	Accounting, tax preparation, bookkeeping and payroll services

<i>SUPC Code</i>	<i>Title</i>
MPS541300	Architectural, engineering and related services
MPS541600	Management, scientific and technical consulting services
MPS541701	Research and development services
MPS561100	Office administrative services

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