

# Extensions of supply and use tables



## Regional Course on Supply and Use Tables Chiba, Japan 20-24 January 2020

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### Outline

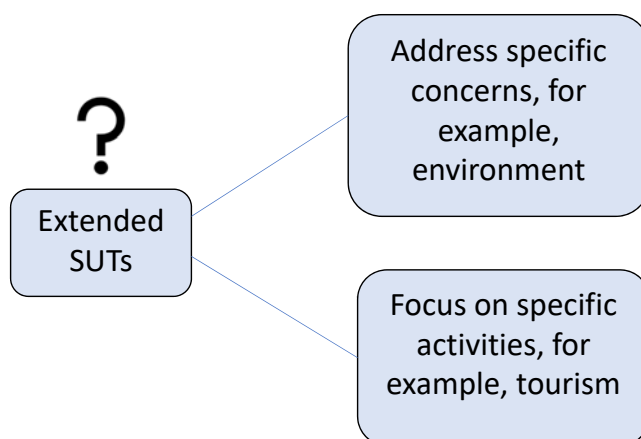


- Why extend the SUTs?
- Institutional sector accounts
- Firm heterogeneity: SUT extensions through statistical business register (SBR)
- SUT extensions – examples
  - Symmetric input output tables
  - Multi country SUT
  - System of Environmental Economic Accounting based on SEEA central framework 2012 and SEEA experimental ecosystem accounts 2012
  - Satellite account for global value chains based on Handbook on Accounting for Global Value Chains (GVCs)
  - Tourism satellite account (TSA) based on TSA: Recommended Methodological Framework 2008



## Why extend the SUTs?

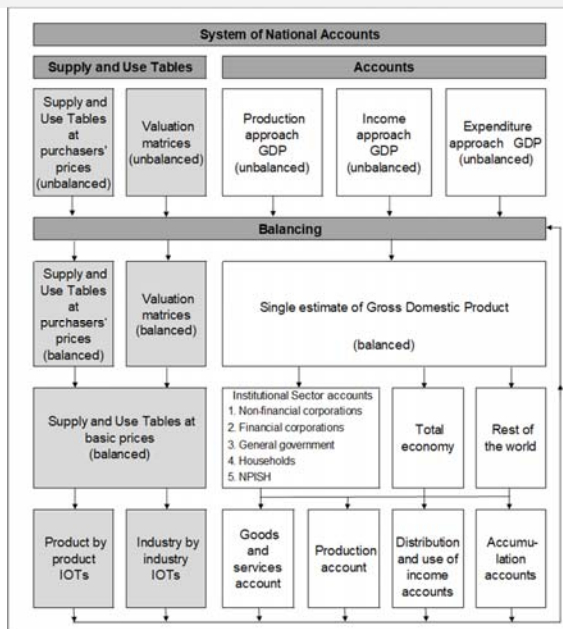
## Why extend the SUTs





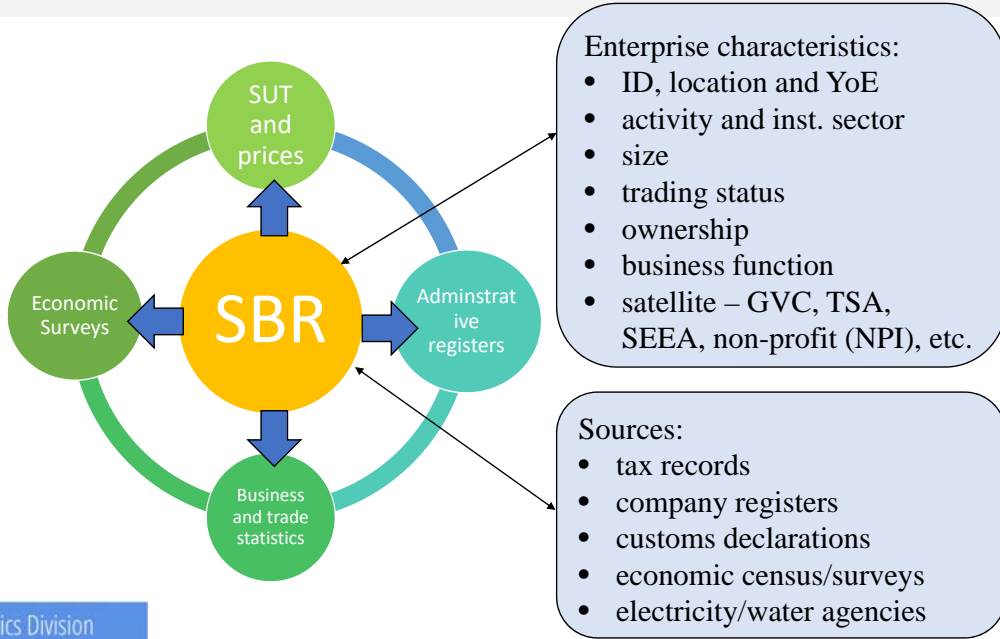
## Institutional sector accounts

## Institutional sector accounts





# Profiling in SBR



# SUT – enterprise type embedded by industry to obtain more homogenous SUT frame



Foreign Owned				Domestically owned MNE				Domestic Owned			
With high Export orientation 'Exporters'		With low Export orientation 'Non-Exporters'		With high Export orientation 'Exporters'		With low Export orientation 'Non-Exporters'		With high Export orientation 'Exporters'		With low Export orientation 'Non-Exporters'	
Low import orientation	High import orientation	Low import orientation	High import orientation	Low import orientation	High import orientation	Low import orientation	High import orientation	Low import orientation	High import orientation	Low import orientation	High import orientation
S	M	L	S	M	L	S	M	L	S	M	L



## SUT extension: Symmetric input-output table

## Harmonized symmetric input-output table



### Integrated Supply and Use framework

	Domestic products	Industries	Final use	Total
Domestic products		$U_d$	$Y_d$	$x$
Imported products		$U_m$	$Y_m$	$m$
Industries	$V$			$g$
Gross value added		$W$		$w$
Total	$x^T$	$g^T$	$y$	

### Input-Output Table - product by product

	Products	Final use	Use
Domestic products	$S_d$	$Y_d$	$x$
Imported products	$S_m$	$Y_m$	$m$
Gross value added	$E$		$w$
Output	$x^T$	$y$	

Through a series of transformations, such as:

#### Model A: Product by Product IOTs based on product technology assumption

Each product is produced in its own specific way, irrespective of the industry where it is produced.

$$T = (D^T)^{-1}$$

$$S_d = U_d T$$

$$S_m = U_m T$$

$$E = W T$$

$$Y_d = Y_d$$

$$Y_m = Y_m$$

Transformation matrix

Domestic intermediates

Imported intermediates

Gross value added

Final use of domestic products

Final use of imported products

### Input-Output Table - industry by industry

	Industries	Final use	Output
Domestic industries	$B_d$	$F_d$	$g$
Imports from industries	$B_m$	$F_m$	$m$
Gross value added	$W$		$w$
Output	$g^T$	$y$	



## SUT extension: Multi country SUTs

## Multi-country SUTs based on harmonized national SUT



		Country A	Country B	Country C	Country A	Country B	Country C	Country A	Country B	Country C	Country A	Country B	Country C	Exports to Rest of the World	Total use (bp)	Total output (bp)
		Product	Product	Product	Industry	Industry	Industry	Final use	Final use	Final use	Exports to Rest of the World	Exports to Rest of the World	Exports to Rest of the World			
Country A	Product															
Country B	Product															
Country C	Product															
Country A	Industry															
Country B	Industry															
Country C	Industry															
Total supply (bp)																
Net FOP payable to foreign governments																
International freight and insurance costs																
Imports from Rest of the World (bp)																
Net taxes on products																
Trade and transport margins																
Imports from all countries (bp)																
Total supply (bp)																
Gross value added (bp)																
Total input (bp)																

		Products	Industry	Final uses
Country A	Products	AGR MAN CON	AGR MAN CON	Final uses Final uses Final uses
	Industries	AGR MAN CON	AGR MAN CON	Final uses Final uses Final uses
	Imports	GVA		
Total				



# System of Environmental Economic Accounting (SEEA) Satellite

## Environmental accounts - Physical SUTs



**Simplified structure of the physical supply table**

	Industries	Industries				Imports	Final consumption	Gross capital formation/Accumulation	Environment	Total
		Agriculture	Manufacturing	...	Services					
Natural inputs	Mineral and energy resources Water								Flows from the environment	Total supply by natural inputs
Products	Agriculture, forestry, etc. Ores and minerals, etc. ... Services	Output by product by Industry				Imports by product				Total supply by product
Residuals	Solid waste Wastewater	Residuals generated by Industry				Residuals received from the RoW	Residuals generated by final consumption	Residuals from scrapping and ...	Residuals recovered from the environment	Total supply by residuals
Total Supply										

**Simplified structure of the physical use table**

	Industries	Industries				Exports	Final consumption	Gross capital formation/Accumulation	Environment	Total
		Agriculture	Manufacturing	...	Services					
Natural inputs	Mineral and energy resources Water	Extraction of Natural inputs								Total use by natural inputs
Products	Agriculture, forestry, etc. Ores and minerals, etc. ... Services	Intermediate consumption by product and by Industry				Exports by product	Final consumption by product and by category	Gross capital formation/Accumulation		Total use by product
Residuals	Solid waste Wastewater	Collection and treatment of waste and other residuals				Residuals sent to RoW		Accumulation of waste in controlled landfilled	Residual flows direct to the environment	Total use by residuals
Total Use										



# SEEA energy accounts



## Core Account 1: Physical Supply and Use Table for energy

PHYSICAL SUPPLY TABLE (unit:PJ)	Production (incl. household own account) & generation of residuals							Accumulation	Flows from the rest of the World (Imports)	Flows from the environment	TOTAL	
	Industries (by ISIC)						Households					
	Agriculture, Forestry & Fishery	Mining & Quarrying	Manufacturing	Electricity, gas, steam & air conditioning supply	Transportation & Storage	Other Industries						Total Industry
(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC H)								
<b>1. Energy from natural inputs:</b>												
Natural resource inputs											1166	1166
Inputs of energy from renewable sources											124	124
Other natural inputs											2	2
<b>2. Energy Products:</b>												
<i>Production of energy products by SIFC class:</i>												
Coal										225		225
Peat and peat products												
Oil shale / oil sands												
Natural gas			395		369						764	764
Oil			721		347						1068	1998
Biofuels		5			2						7	7
Waste		39			55						94	111
Electricity						212					212	234
Heat						79					79	79
Nuclear fuels and other fuels												
<b>3. Energy Residuals:</b>												
Total energy residuals	50	48	432	307	632	96	1565	240				1805
<b>4. Other Residual Flows:</b>												
Residuals from end-use for non-energy purposes				51								51
Energy from solid waste									94			94
<b>5. TOTAL SUPPLY</b>												
	94	1164	885	969	632	96	3840	240	94	1194	1292	6660

# SEEA water accounts



## Core Account 1: Physical Supply and Use Table for water

PHYSICAL SUPPLY TABLE	Industries (by ISIC)						Households	Flows from the Rest of the World (Imports)	Flows from the Environment	TOTAL SUPPLY		
	Agriculture, Forestry & Fishery	Mining and Quarrying	Manufacturing	Electricity, gas, steam & air conditioning supply	Water collection, treatment & supply	Sewerage					Other Industries	Total Industry
	(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC 36)	(ISIC 37)						
<b>1. Sources of Abstracted Water:</b>												
Inland Water Resources									967	967		
of which: Surface water									441	441		
of which: Groundwater									476	476		
Other Water Sources									202	202		
TOTAL SUPPLY ABSTRACTED WATER									1 169	1 169		
<b>2. Water:</b>												
For distribution	0	0	0	0	378	0	0	378	0	378		
For own use	108	34	80	404	14	100	2	743		743		
<b>3. Wastewater and reused water:</b>												
Wastewater to treatment	18	35	82	6	1	0	49	191	236	427		
Own treatment of wastewater	0	0	0	0	0	0	0	0	0	0		
Reused water produced (for distribution)	0	3	7	0	0	43	0	53	0	53		
TOTAL WASTEWATER AND REUSED WATER	18	38	89	6	1	43	49	244	236	479		
<b>4. Return flows of water:</b>												
To inland water resources	65	7	16	300	47	228	1	664	5	668		
To other sources	0	2	5	100	0	256	0	363	0	363		
TOTAL RETURN FLOWS	65	9	21	400	47	484	1	1 026	5	1 031		
of which: losses in distribution	0	0	0	0	47	0	0	47	0	47		
<b>5. Evaporation of abstracted water, transpiration and water incorporated into products:</b>												
TOTAL WATER EVAPORATED, TRANSPIRED AND INCORPORATED INTO PRODUCTS	76	13	30	3	2	1	4	128	10	138		
<b>6. TOTAL SUPPLY</b>												
	268	94	220	812	443	627	56	2 520	250	0	1 169	3 939



## SUT extension: Global value chain (GVC) satellite

## Global value chain (GVC) satellite accounts



- In order to develop a satellite account for a GVC, we have to elaborate in SNA concepts and classifications the following:
  - Type of GVC (e.g. automotive, textiles, electronics, oil and gas, etc.)
  - GVC relevant geographical boundary (e.g. what are the main partners in the specific GVC)
  - GVC governance (e.g. identification of 'lead firms', 'affiliated firms' etc.)
  - GVC-relevant industry breakdown (e.g. mapping to ISIC)
  - GVC-relevant product breakdown (e.g. mapping to CPC)
  - GVC-relevant additional information (e.g. employment, capital, etc.)

## Business governance



GVC concept	BOP/IIP and FDI	National Accounts
<b>Lead Firm</b>	Ultimate controlling parent  Classified in S11 when it concerns corporate groups	Ultimate controlling parent  Classified in S11 (Head Office) when it concerns corporate groups  S.11UP
<b>Affiliated firm</b>  Affiliated firms are defined on the basis of control that the lead firm has directly or indirectly on the affiliated firm.  This control derives from direct or indirect ownership and management control and is similar to the concept used in FDI.	Direct Investment Enterprise,  Subsidiary (controls > 50% of share votes)	Foreign Controlled Non-Financial Corporation  S.11FC
<b>Non-affiliated firm</b>  Non-affiliated firms are defined as being closely (if not uniquely) devoted to the production of goods and services needed in the GVC. They are not owned or controlled directly or indirectly by the lead firm.  In order to identify non-affiliated firms a criterion is needed to define the close relationship to the production in a GVC, such as the share of output provided to a single GVC.	Direct Investment Enterprise  Associate (influences 10% < <50% of share votes)  Other enterprises  No influence < 10% of share vote.  Unrelated firms are enterprises that fall outside any FDI relationship, either as investor or as investment enterprise.	Foreign Associate Non-Financial Corporation  S.11FA  Nationally Controlled Non-Financial Corporation  S.11NA
<b>Dedicated Financial Institution</b>	Foreign Controlled Captive Financial Institution  These are direct investment enterprises that are foreign controlled, e.g. subsidiaries.	Foreign Controlled Captive Financial Institution  S.127FC

## Business functions



- GVCs are characterized by a sequence of business production processes that bring a product to its final consumers from its conception
- **Business functions** are the activities carried out by an enterprise; they can be divided into **core functions** and **support functions**

**Core business functions** are activities of an enterprise yielding income: the production of final goods or services intended for the market or for third parties.

**Support business functions** are supporting activities carried out by the enterprise in order to permit or to facilitate the core business functions, its production activity.

- distribution and logistics
- marketing, sales and after-sales services
- information and communication technology (ICT) services
- administrative and management functions
- engineering and related technical services
- research & development (R&D)

Need correspondence to ISIC

# Mapping business functions to ISIC for the automotive GVC



Core Business function	ISIC Rev.4 code
Production of automotive	ISIC 291- Manufacture of motor vehicles
Support Business function	ISIC Rev.4 code
Distribution and logistics: Transportation activities, warehousing and order processing.	ISIC H - Transportation and storage ISIC 49 - Land transport and transport via pipelines ISIC 50 - Water transport ISIC 51 - Air transport ISIC 52 - Warehousing and support activities for transportation ISIC 53 - Postal and courier activities
Marketing, sales and after-sales services: market research, advertising, direct marketing services (telemarketing), exhibitions, fairs and other marketing or sales services; also included are call-centre services and after-sales services such as help-desks and other customer support services.	ISIC 73 - Advertising and market research
Information and communication technology (ICT) services: information technology (IT) services and telecommunication (IT services including hardware and software consultancy, customised software data processing and database services, maintenance and repair, web-hosting, as well as other computer-related and information services, but excluding packaged software and hardware).	ISIC 62 - Computer programming, consultancy and related activities ISIC 63 - Information service activities
Administrative and management functions: legal services, accounting, book-keeping and auditing, business management and consultancy, human resources (HR) management (e.g. training and education, staff recruitment, provision of temporary personnel, payroll management as well as health and medical services), corporate financial and insurance services; also included are procurement functions.	ISIC 70 - Activities of head offices; management consultancy activities ISIC 69 - Legal and accounting activities
Engineering and related technical services: engineering and related technical consultancy, technical testing, analysis and certification; also included are design services.	ISIC 71 - Architectural and engineering activities; technical testing and analysis
Research & development (R & D): research and experimental development.	ISIC 72 - Scientific research and development

## GVC products



- GVC products are those products (goods and services) that are inputs into the production process
- The product mapping depends on the specific GVC:
  - Product mapping for the GVC for automotive is very different than the product mapping for the GVC for textiles or electronics



# GVC SUTs



Use Table at basic prices

	Industries											FINAL USE							
	ISIC 1	...	ISIC 291 Manufacture of motor vehicles	ISIC 49-51 Distribution and logistics	ISIC 73 Marketing, sales and after-sale services	ISIC 82-83 ICT services	ISIC 69-70 Administration and management functions	ISIC 71 Engineering and related technical services	ISIC 72 Research and development	...	Output	Final consumption expenditure	Gross capital formation	Exports				Total	Total use
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)			(12)	(13)	Total	to Country B		
...	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
PRODUCTION																			
CPC 637 Market research etc.	(3)																		
CPC 4911 - Motor vehicles	(5)																		
...	(6)																		
...	(7)																		
...	(8)																		
...	(9)																		
Total	(9)																		
ADJUST																			
Direct purchases abroad by res.	(11)																		
Total	(12)																		
GVA																			
Compensation of employees	(13)																		
Other taxes less subsidies on production	(14)																		
Consumption of fixed capital	(15)																		
Net operating surplus/mixed income	(16)																		
Gross operating surplus/gross mixed income	(17)																		
GVA	(18)																		
Total input at basic prices	(19)																		

	Industries										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gross capital formation by asset type	(1)										
Capital stock by asset type	(2)										
Labour by relevant breakdown	(3)										
TEC indicators (??)	(4)										
number of enterprises	(5)										
size enterprises by size class	(6)										

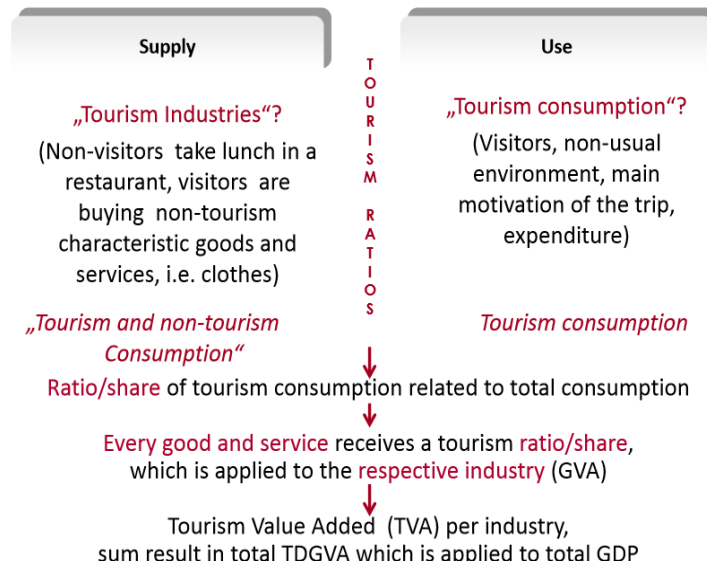


# SUT extension: Tourism satellite account

# Tourism satellite account



## Integration of Supply and Use



# Tourism satellite account



## • Elaboration of the products

### (1) Tourism characteristic products:

#### Internationally comparable tourism characteristic products

- Accommodation services for visitors
  - Accommodation services other than vacation homes
  - Vacation homes
- Food and beverage serving services
- Railway passenger transport services
- Road passenger transport services
- Water passenger transport services (coastal and inland)
- Air passenger transport services
- Transport equipment rental services
- Travel agencies and other services (margin only)
- Cultural services (theater, museums, etc.)
- Sports and recreational services (entry fees to sport events, casino, etc.)

#### Country-specific tourism characteristic products

- Country-specific tourism characteristic goods
- Country-specific tourism characteristic services

### (2) Other consumption products (tourism connected and non-tourism related)

### (3) Valuables (purchases exceeding the custom's threshold within merchandise trade)



# Tourism satellite account: Table 6

## Total Supply and Internal Tourism Consumption by Products

Goods and services	Tourism-characteristic industries				Other industries	Total output of domestic producers	Imports	Taxes less Subsidies	Total output of domestic producers	Internal tourism consumption (TSA-Table 4)	Tourism ratio
	1	...	12	Σ							
Tourism characteristic goods and services											
Other consumption goods and services											
Valuables											
<b>Output</b>											
Intermediate consumption											
<b>Gross Value Added (GVA)</b>											
<b>Gross Value Added (GVA) of Tourism</b>											

Basic/producers prices      Purchasers prices

= Gross Valued Added (GVA) \* Tourism ratio



# Tourism satellite account: Table 6

Products	TOURISM INDUSTRIES										Other industries	Output of domestic producers (basic prices)	Imports	Taxes less subsidies on products produced and imported	Taxes and transfer receipts	Domestic supply at purchasers prices	Internal tourism consumption	Tourism ratio (%)		
	1 - Accommodation		1-a Accommodation services for visitors except in B		1-b Accommodation services and products of type of tourist (non-residents)		2 - Food and beverage services		3 - Other specific tourism characteristics										TOTAL	
	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000									1000	1000
	(B.1)	(B.2)	(B.3)	(B.4)	(B.5)	(B.6)	(B.7)	(B.8)	(B.9)	(B.10)	(B.11)	(B.12)	(B.13)	(B.14)	(B.15)	(B.16)	(B.17)	(B.18)	(B.19)	
<b>A. Consumption products (*)</b>																				
A.1 Tourism characteristic products (B)																				
1 - Accommodation services other than B.1																				
1a - Accommodation services for visitors other than B.1																				
1b - Accommodation services associated with all types of tourism (non-residents)																				
2 - Food and beverage services																				
2a - Food and beverage services																				
2b - Other passenger transport services																				
3 - Other specific tourism characteristics																				
3a - Water passenger transport services																				
3b - Air passenger transport services																				
3c - Transport equipment rental services																				
3d - Travel agencies and other reservation services																				
3e - Other services																				
3f - Sports and recreational services																				
3g - Cruise specific tourism characteristics																				
3h - Cruise specific tourism characteristics																				
<b>A.2 Other consumption products (C)</b>																				
B.1 Valuables																				
B.2 Other non-consumption products (D) (B.1)																				
<b>I. TOTAL OUTPUT (at basic prices)</b>																				
<b>II. TOTAL INTERMEDIATE CONSUMPTION (at purchasers prices) (C)</b>																				
<b>III. TOTAL GROSS VALUE ADDED (at basic prices)</b>																				
Compensation of employees																				
Gross fixed capital formation																				
Gross operating surplus																				

X - Not applicable

... Means that all tourism industries of the reported list have to be considered one by one in the estimation

# Exports less imports of goods

(\*) The value of A. Consumption products, less of the gross value added paid to travel agencies, tour operators and other reservation services

(1) Excludes all other goods and services that do not fit in the category of tourism

(2) Excludes all other goods and services that do not fit in the category of tourism

(3) Excludes all other goods and services that do not fit in the category of tourism

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