Eclac’s Value Chain Dashboard

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KEY MILESTONES IN LAC IOT

- 2010-2013: Commissioning Project ECLAC IPEA (2013)
- 2014: First Results for 5 countries; Analysis teams of consultants
- 2015: Preliminary South American IOT; 8 countries 18/11/2015
- 2016: Relaunch of South American IOT; 8 countries 6-07-2016
- 2019: Start of integration of the Regional IOT into a Global IOT
- 2020: Launch of the Central American IOT and First Version of the Regional IOT (July 2019) SIECA
- South-American IOT 2011 (1-08-2018)
- Project in continuous development: we have been working to get to more recent years (2014-2015) and include the Regional IOT in a global project (2019)
National and Sub-regional IOTs in Latin America (18 countries)

18 National Matrices
40 sectors
Years: 2005* and 2011

Mexico IOT

Central America IOT

Andean Community IOT*

Chile IOT*

MERCOSUR IOT*
## Sectors selected for the harmonization of Latin American IOT:

### 40 sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
<th>ISIC Code (Rev. 3)</th>
<th>Primary</th>
<th>Manufacturing</th>
<th>Services</th>
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</thead>
<tbody>
<tr>
<td>s1</td>
<td>Agriculture and forestry</td>
<td>0111 0112 0113 0121 0122 0130 0140 0200</td>
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<tr>
<td>s2</td>
<td>Hunting and fishing</td>
<td>0150 0500</td>
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<tr>
<td>s3</td>
<td>Mining (energy)</td>
<td>1010 1020 1030 1110 1120 1200 1310 1410 1421 1422 1429</td>
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<td>s4</td>
<td>Mining (non-energy)</td>
<td>1511 1512 1514 1520 1531 1532 1541 1544</td>
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<tr>
<td>s5</td>
<td>Meat and meat; dairy milk</td>
<td>1616 1617 1619 1661 1662 1663 1671 1672 1673</td>
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<td>s6</td>
<td>Gringing, baking and pasta</td>
<td>1717 1721 1723 1810 1911 1912</td>
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<td>s7</td>
<td>Sugar and confectionery products</td>
<td>1818 1828 1838 1938</td>
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<tr>
<td>s8</td>
<td>Other food products</td>
<td>1919 1929 1939 1949</td>
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<td>s9</td>
<td>Drinks</td>
<td>2010 2020 2022 2023 2029</td>
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<tr>
<td>s10</td>
<td>Snuff products</td>
<td>2110 2120 2130 2210 2220 2230</td>
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<td>s11</td>
<td>Textiles</td>
<td>2310 2320 2330</td>
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<td>s12</td>
<td>Garments</td>
<td>2411 2412 2413</td>
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<td>s13</td>
<td>Footwear</td>
<td>2520 2530 2540</td>
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<td>s14</td>
<td>Wood and products of wood and cork</td>
<td>2610 2640 2650 2660 2670 2680 2690 2700 2710</td>
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<tr>
<td>s15</td>
<td>Rulp, paper, paper, printing and publishing</td>
<td>2810 2812 2813 2891 2892 2893 2900 2910 2920</td>
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<tr>
<td>s16</td>
<td>Glie, refined petroleum and nuclear fuel</td>
<td>3010 3020 3030 3040 3050 3060 3070 3080 3090</td>
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<td>s17</td>
<td>Basic chemicals</td>
<td>3110 3120 3130 3140 3150 3190 3210</td>
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<tr>
<td>s18</td>
<td>Other chemicals (excluding pharmaceuticals)</td>
<td>3220 3230 3240 3250 3260 3270 3280 3290</td>
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<tr>
<td>s19</td>
<td>Pharmaceutical</td>
<td>3320 3330 3340 3350</td>
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<tr>
<td>s20</td>
<td>Rubber and plastic</td>
<td>3410 3420 3430</td>
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<tr>
<td>s21</td>
<td>Nonmetallic minerals</td>
<td>3511 3512 3520 3530 3540 3550</td>
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<tr>
<td>s22</td>
<td>Iron and steel</td>
<td>3610 3620 3630</td>
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<tr>
<td>s23</td>
<td>Non-ferrous metals</td>
<td>3710 3720</td>
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<tr>
<td>s24</td>
<td>Metal fabricated metal products (excluding machinery and equipment)</td>
<td>3810 3820 3830 3840</td>
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<tr>
<td>s25</td>
<td>Machinery and equipment (excluding electrical machinery and equipment)</td>
<td>3910 3920 3930</td>
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<tr>
<td>s26</td>
<td>Office equipment (including computer equipment)</td>
<td>4410 4420 4430</td>
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<tr>
<td>s27</td>
<td>Machinery and electrical appliances</td>
<td>4510 4520 4530</td>
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<tr>
<td>s28</td>
<td>Radio, television and telecommunications equipment team</td>
<td>4610 4620 4630</td>
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<tr>
<td>s29</td>
<td>Optical medical equipment and precision instruments</td>
<td>4710 4720 4730</td>
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<tr>
<td>s30</td>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>4810 4820 4830 4840 4850 4860</td>
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<tr>
<td>s31</td>
<td>Aircraft</td>
<td>4920 4930 4940</td>
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<tr>
<td>s32</td>
<td>Other transport equipment transport</td>
<td>5010 5020 5030</td>
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<tr>
<td>s33</td>
<td>Other articles: recycling, furniture and other</td>
<td>5110 5112 5120</td>
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<tr>
<td>s34</td>
<td>Electricity, gas and water water</td>
<td>5210 5220 5230</td>
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<tr>
<td>s35</td>
<td>Construction</td>
<td>5310 5320 5330</td>
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<tr>
<td>s36</td>
<td>Transport</td>
<td>5410 5420 5430</td>
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<tr>
<td>s37</td>
<td>Post and telecommunications</td>
<td>5510 5520 5530</td>
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<tr>
<td>s38</td>
<td>Finance and insurance</td>
<td>5610 5620 5630 5640 5650 5660</td>
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<tr>
<td>s39</td>
<td>Services to businesses of all kinds</td>
<td>5710 5720 5730</td>
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<tr>
<td>s40</td>
<td>Other services</td>
<td>5810 5820 5830</td>
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</tbody>
</table>

Source: ECLAC on the basis of IOM and / or national SIT, considering on the work of the respective national teams.

Each of the National IOTs was reclassified to 40 Sectors
The First Latin American (18) Input-Output Table

Andean Community IOT
MERCOSUR IOT
Central American IOT
+ Mexico
+ Chile
+ Dominican Republic

Subregional IOTs

National IOTs

18 National Matrices
40 X 40
Years: 2011 and 2014 (ongoing)
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1. Selection of Parameters

- 40 Sectors
- Reporters: 10 Countries (2005), 18 countries (2011 & 2014)
- Partners: 10 extra regional partners (2005), 37 extra regional partners (2011 & 2014)

2. Selection of Set of Indicators

- Employment indicators
- Two set of value chain indicators
  - National linkages indicators
  - Regional linkages indicators
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National indicators

✓ Motivation:

✓ The productive linkages are the relationships established between the sectors in the production process.

✓ What happens when the final demand for a good increases, be it for final consumption, exports or investment?

✓ Each participant in the production chain, as a supplier of intermediate inputs of the product j, will be affected by the increase in j production.

✓ How much will these other industries be affected? Well, it's going to depend on the degree to which all industries are connected. This is called backward linkages (BL)

✓ For the forward linkages (FL), we use the distribution coefficients B of the Gosh matrix

✓ Main goal: identify key sectors and their weight on products
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National indicators

• Leontief Inverse
• Ghosh Inverse
• Backwards and forwards Linkages (FL & BL);
• Identify local value chains and relevant sectors (Drivers, driven, keys, independent)
• Import / Domestic Ratio
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• The Leontief inverse matrix \((I - A)^{-1}\) is a multiplier that reports on how much the production of the entire economy has to increase to satisfy an increase in final demand of one sector, the backward productive linkages.

\[ x = (I - A)^{-1}y \]

• Ghosh Inverse is used as an alternative method of analysis of forward productive linkages.

Ghosh Inverse:

\[ G = (I - B)^{-1} \]
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National indicators

• Leontief Inverse
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- Backward linkages (BL)

\[
L = \begin{bmatrix}
l_{11} & l_{12} & l_{13} \\
l_{21} & l_{22} & l_{23} \\
l_{31} & l_{32} & l_{33}
\end{bmatrix}
\]

\[L = (I - A)^{-1}\]

\[
BL_j = \frac{\sum_{i=1}^{N} l_{ij}}{\frac{1}{N} \sum_{i=1}^{N} \sum_{j=1}^{N} l_{ij}}
\]

- Forward linkages (FL)

\[
G = \begin{bmatrix}
g_{11} & g_{12} & g_{13} \\
g_{21} & g_{22} & g_{23} \\
g_{31} & g_{32} & g_{33}
\end{bmatrix}
\]

\[G = (I - B)^{-1}\]

\[
FL_i = \frac{\sum_{j=1}^{N} g_{ij}}{\frac{1}{N} \sum_{i=1}^{N} \sum_{j=1}^{N} g_{ij}}
\]
<table>
<thead>
<tr>
<th></th>
<th>Backward linkages &lt; 1</th>
<th>Backward linkages &gt; 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forward linkages &gt; 1</strong></td>
<td>(II) FL Sectors</td>
<td>(I) KEY Sectors</td>
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</tr>
<tr>
<td><strong>Forward linkages &lt; 1</strong></td>
<td>(III) Independents Sectors</td>
<td>(IV) BL Sectors</td>
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</table>
## Eclac’s Value Chain Dashboard

### 2005 - 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Agricultura y forestal</th>
<th>Caza y pesca</th>
<th>Minería (energía)</th>
<th>Minería (no energía)</th>
<th>Carne y derivados</th>
<th>Madera y madera y corcho</th>
<th>Papeles, imprentas y editoriales</th>
<th>Coque, petróleo refinado y combustible nuclear</th>
<th>Productos químicos básicos</th>
<th>Otros productos químicos (excluye farmacéuticos)</th>
<th>Productos farmacéuticos</th>
<th>Productos de caucho y plástico</th>
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<td></td>
<td>Argentina</td>
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<td>Independientes</td>
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### 2011 - Argentina

<table>
<thead>
<tr>
<th>Year</th>
<th>Countries</th>
<th>Agricultura y forestal</th>
<th>Caza y pesca</th>
<th>Minería (energía)</th>
<th>Minería (no energía)</th>
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### 2011 - Brazil

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### 2011 - Argentina, Brazil

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<th>Caza y pesca</th>
<th>Minería (energía)</th>
<th>Minería (no energía)</th>
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Eclac’s Value Chain Dashboard

National indicators

- Leontief Inverse
- Ghosh Inverse
- Backwards and forwards Linkages (FL & BL);
- Identify local value chains and relevant sectors (Drivers, driven, keys, independent)
- Import / Domestic Ratio
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National indicators: Import / Domestic inputs ratio

It is used to compare the value of import and domestic inputs used in the production of a country p.

For the economy as a whole:

\[ RII_p = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} Z_{ij}^M}{\sum_{i=1}^{N} \sum_{j=1}^{N} Z_{ij}^D} \]

By sectors:

\[ rii_j = \frac{\sum_{i=1}^{N} Z_{ij}^M}{\sum_{i=1}^{N} Z_{ij}^D} \]
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National indicators: Import / Domestic inputs ratio
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Regionals indicators

- Vertical specialization: Imports of intermediate goods needed to exports. Identify sectors
- Value added on exports
- Employment associated with exports
The vertical specialization allows us to identify how much we need to import to satisfy the gross value of production (or of one of its components, e.g., exports):

\[ EV2_p = A^M_p (I - A)^{-1} \hat{e}_p \]

Where \( A^M \) is the imported technical coefficients matrix \( N \times N \) and \( \hat{e} \) is the vector \( N \times 1 \) of gross (total) exports of the country \( p \).
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Regionals indicators: Vertical specialization

Imports of intermediate goods need to exports

\[
EV1_A = \sum_{i,j=1}^{N} (A_{ij}^M \hat{e}_{ij}^{A,B})
\]

- \(EV1_A\) vertical specialization, total imports needed for satisfy total exports to country B

\[
EV1_B = \sum_{i,j=1}^{N} (A_{ij}^C \hat{e}_{ij}^{C,B})
\]

- \(EV1_B\) vertical specialization, imports needed from country C to satisfy total exports

\[
EV1_C = \sum_{i,j=1}^{N} (A_{ij}^A \hat{e}_{ij}^{A,C,B})
\]

- \(EV1_C\) vertical specialization, imports needed from country A for satisfy total exports to country B
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Regionals indicators

- Vertical specialization: Imports of intermediate goods needed to exports. Identify sectors
- Value added on exports
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Regionals indicators : Value added on exports

\[ VADe_p = \hat{V}_p (I - A^D)^{-1} \hat{e}_p \]

- Regional forward linkage, total domestic value added on export to a specify destination
WE CAN CHOOSE ALL THE REPORTERS COUNTRIES FOR ONE YEAR

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% of total exports to

ARG BOL BRA CHL COL CRI ECU MEX NIC PAN PAR PER ROD SLV URY VEN

0 20 40 60 80 100 120
FOR ONE COUNTRY, DIFFERENT OPTIONS: DISAGGREGATE THE VALUE ADDED BY DESTINATION

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Argentina VA % of exports, by region

% of total exports to

FOR ONE COUNTRY, DIFFERENT OPTIONS: DISAGGREGATE THE VALUE ADDED BY DESTINATION
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For one country, different options: compare the value added as % of total exports between regions.
FOR ONE COUNTRY, DIFFERENT OPTIONS:
COMPARE VALUE ADDED AS % OF TOTAL EXPORTS BETWEEN SECTORS

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% of total exports to world

% of VA on total exports, by sector
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FOR ONE COUNTRY, DIFFERENT OPTIONS: CHOOSE ONE SECTOR, BY COUNTRY

% of total exports to world

% VA, for S1 by total exports by country

% of VA on total exports, by sector
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Regionals indicators

• Vertical specialization: Imports of intermediate goods needed to exports. Identify sectors
• Value added on exports
• Employment associated with exports
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Regionals indicators: employment associated with exports

- Each sector has a given job requirement, for each year, to produce a specific amount of VBP. (CE)
- By pre-multiplying our employment multiplier by the exports of a country, we obtain export employment, those generated in the sector (direct) and those generated in other sectors (indirect)

\[ \text{Empleo exportador} = \hat{CE}(I - A)^{-1} \hat{e} \]

- The vector \( e \) of exports can satisfy different types of research requirements:
  - Total exports from Country A to Country B
  - Total Exports from Country A to a region of the world (Latin America, Asia, FEALAC)
From South American to Latin American
Input-Output Table (2011 – 2014) and
a project to build a Global IOT

José E. Durán Lima
Chief of the Regional Integration Unit,
Division of International Trade and Integration, ECLAC,
United Nations

OECD, Paris, 27 June 2019