

MEASURING AND UNDERSTANDING THE DIGITAL ECONOMY



Telecom Advisory Services, LLC

Nueva York – Buenos Aires – México D.F. – Bogotá

Big Data for Measuring the Digital Economy Workshop
Santiago, March 17th, 2017

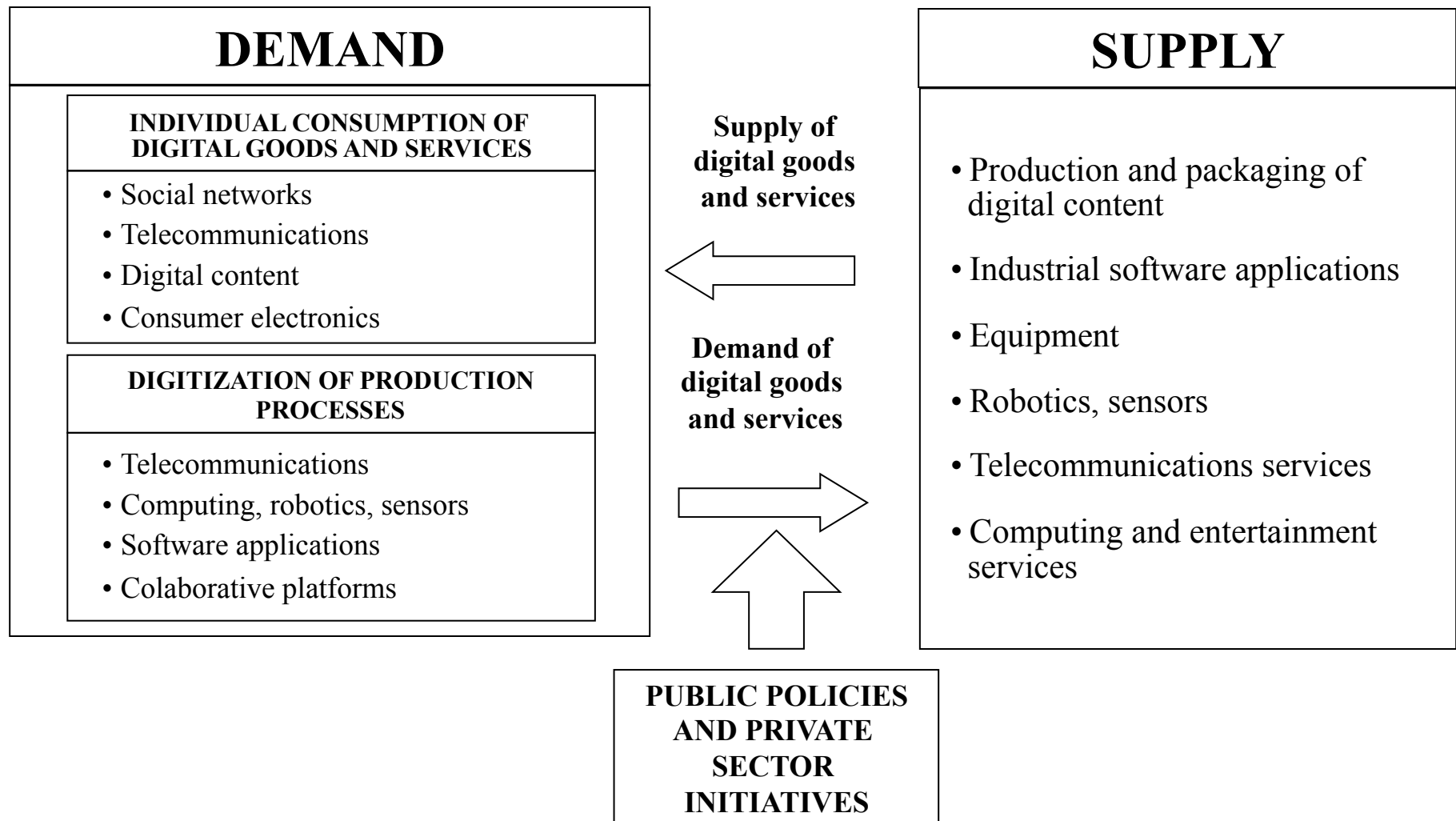
THE PURPOSE OF THIS PRESENTATION IS TO PROVIDE AN INTRODUCTION TO THE UNDERSTANDING OF THE DIGITAL ECONOMY AND PROPOSE A MEASUREMENT APPROACH

- The concept of digital economy has not been rigorously defined so far
 - What are the industries to be included? Telecommunications? Internet platforms and OTTs? Audiovisual content creation and distribution? Videogames? Collaborative economy platforms, such as Uber, and airbnb?
 - Beyond defining the industries to be included in order to measure their “weight” in the economy, what are the other components that require an understanding? Factors of production (human capital, capital)? Differentiation between the demand and supply sides?
 - The concepts of digital economy and digital ecosystem are used interchangeably; are they different?
- If the theoretical framework of the digital economy is not well defined, it is difficult to measure it
- If we cannot measure it, it is difficult to ascertain its impact (beyond direct contribution) and, consequently, define the right development policies

AGENDA

- A theoretical framework to measure the digital economy
- The Latin America and Caribbean digital economy
- Issues of measurement of the digital economy

OUR ORIGINAL FRAMEWORK FOR UNDERSTANDING THE DIGITAL ECONOMY WAS STRUCTURED AROUND AN AGREGATION OF DEMAND AND SUPPLY OF DIGITAL GOODS AND SERVICES



THE SUPPLY SIDE COMPRISED A DEFINITION OF A CONVERGENT PRODUCTIVE CHAIN

EXAMPLE

COMPARATIVE PROFITABILITY (EBIT/SALES) (2014)



AGGREGATED EBIT (%)	•Average: 22.65% (range: 23.64% - -21.67%)	• Average: 1%	• Average: -0.8% (*)	• Average: 24.12% (range: 7.31% - 40.06%)	•Average: 9.62% (range: 7.37% - 11.87%)	•Average: 1.0%	•Average: 17.63% (range: 16.56% - 18.71%)	•Average: 22.40% (range: 16.08% - 28.72%)
EBIT LATAM (%)	•Average: 24.73% (range: 24.07% - 25.39%)	• Average: 28.62% (range: 32.49% - 24.76%)		• Average: 94.47% (range: 91.73% - 92.78%)			• Average: 16.42% (range: 7.71% - 20.81%)	

Source: Telecom Advisory Services analysis

HOWEVER, WHILE ADVANTAGEOUS IN SOME DIMENSIONS, THIS FRAMEWORK HAD SEVERAL LIMITATIONS

ADVANTAGES

- Provided a first measurement (weight on GDP, digitization index, supply of digital goods and services)
- Incorporated the measurement of digitization of consumption
- Introducuds the concept of digitization of production
- Allowed an analysis of the interaction among industry players in the production chain (comparative sale, profits, effective taxation rates)

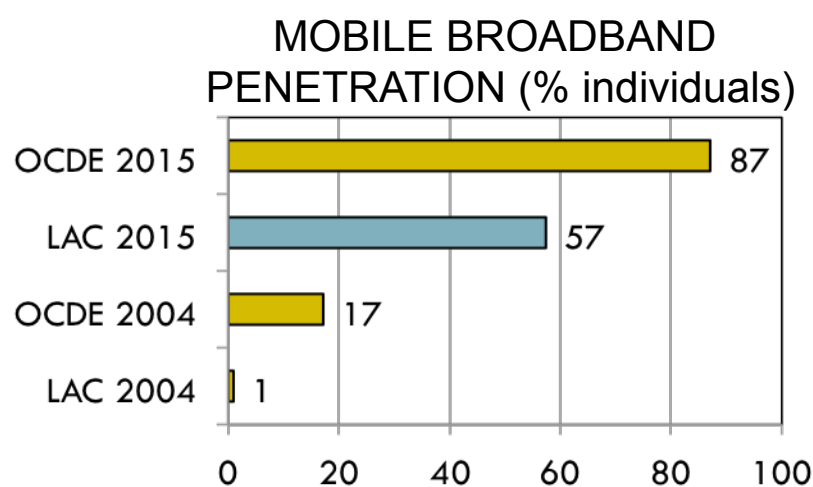
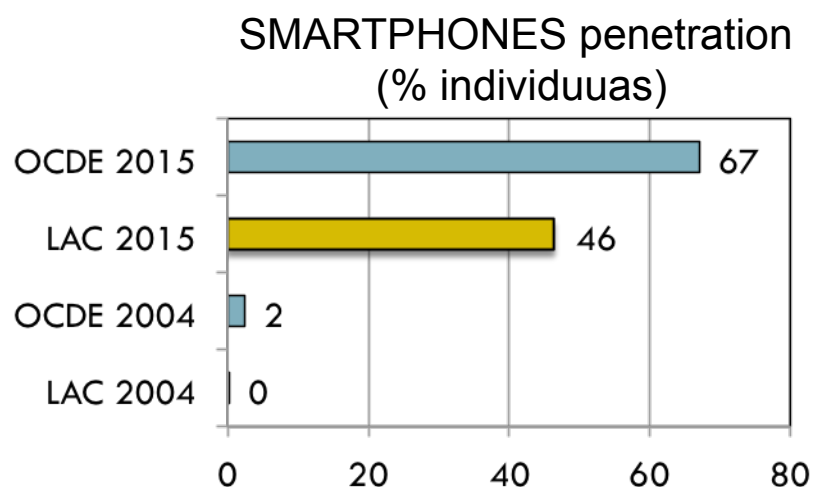
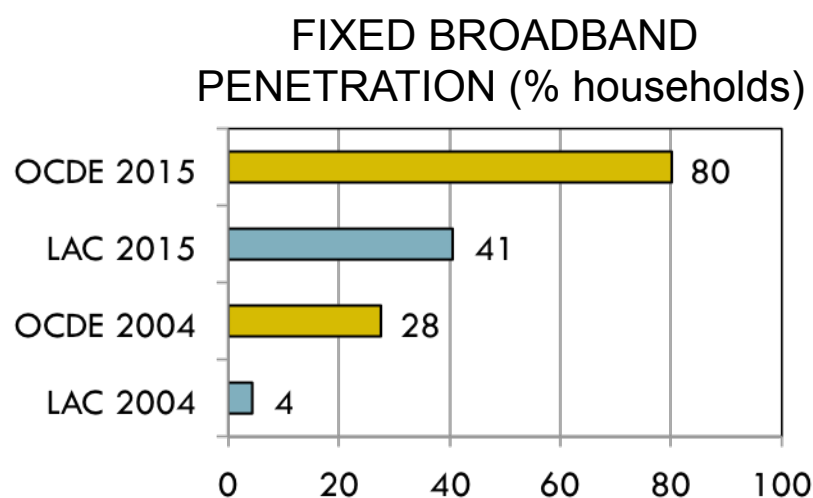
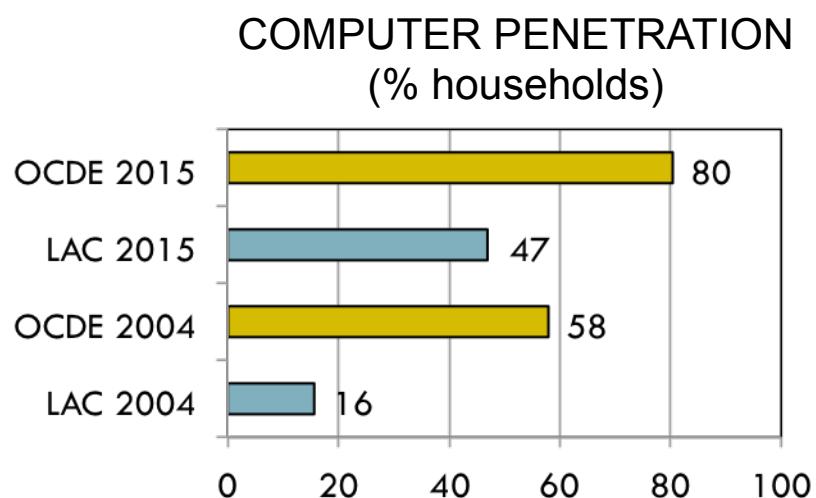
DISADVANTAGES

- Lacked an understanding of production factors
- Did not provide a systemic view of the different components of the digital economy (for example, how important is local human capital in the development of digital industries?)
- While mentioning the institutional and policy framework, it did provide a metric of its development?

THEREFORE, WE BELIEVED WE NEEDED ANOTHER THEORETICAL FRAMEWORK AND TOOL TO MEASURE THE DIGITAL ECONOMY

- The current effort has been conducted in the context of a project aimed at developing an Observatory of the Digital Ecosystem in Latin America
- A database (154 indicators) measuring different aspects of the digital economy for 74 countries around the world, selected on the basis of the size of their economy
- A composite index that monitors the development of the digital economy on an annual basis (since 2004 until now) not only at the aggregate level but also in terms of each of its components or pillars
- A compilation of policies, regulatory initiatives, and infrastructure programs that allows the measurement of their development impact
- A regional aggregation of indices to understand the relative position of Latin America

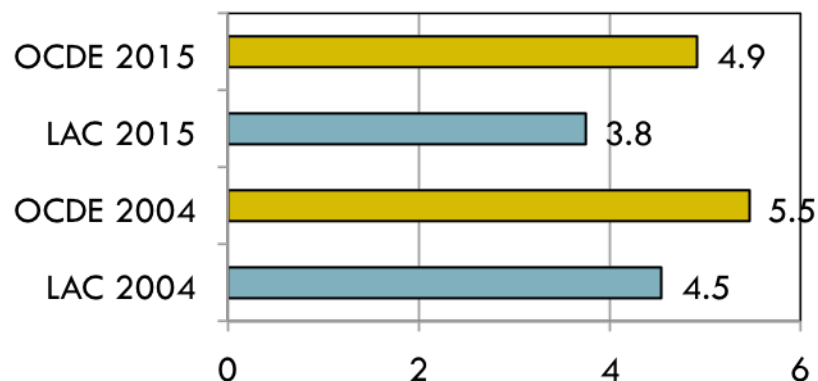
THE DATA REPOSITORY PROVIDES THE ABILITY TO COMPARE COMMON INDICATORS AT A REGIONAL LEVEL OVER TIME



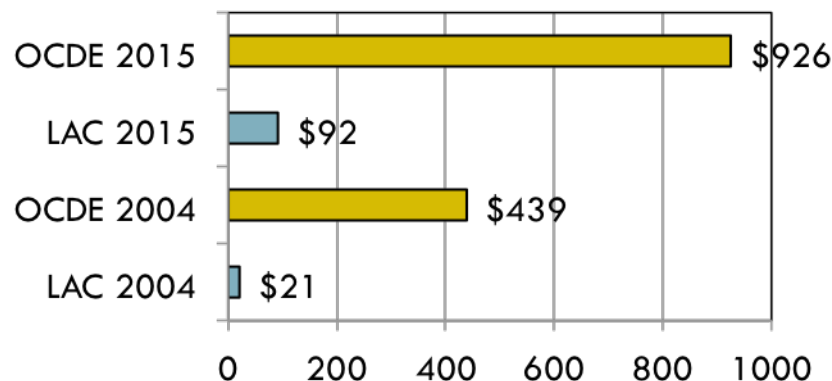
Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

ADDITIONALLY, THE OBSERVATORY INCLUDED INDICATORS MEASURING THE “WEIGHT OF THE DIGITAL ECONOMY”

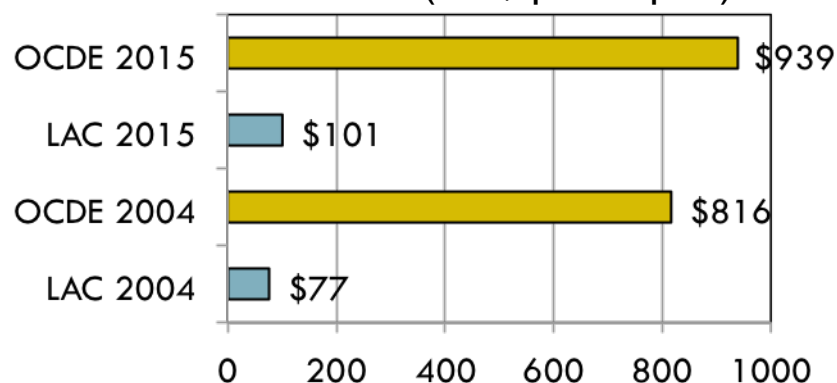
**WEIGHT OF THE DIGITAL ECONOMY
(Gross Sales/PIB)**



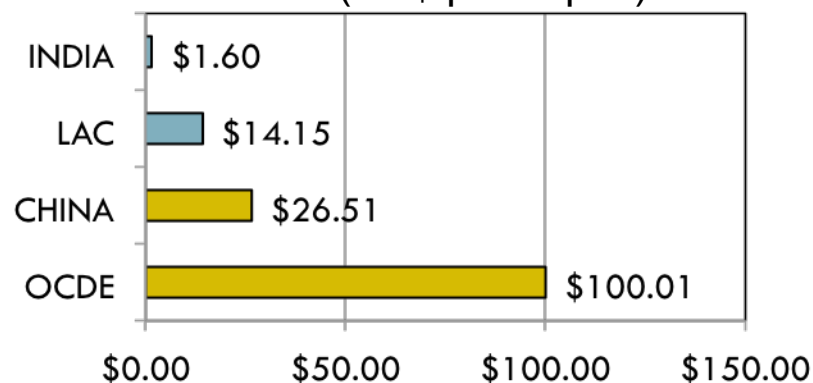
**HIGH TECHNOLOGY SERVICE EXPORTS
(US\$ per capita)**



**HIGH TECHNOLOGY PRODUCT
EXPORTS (US\$ per capita)**

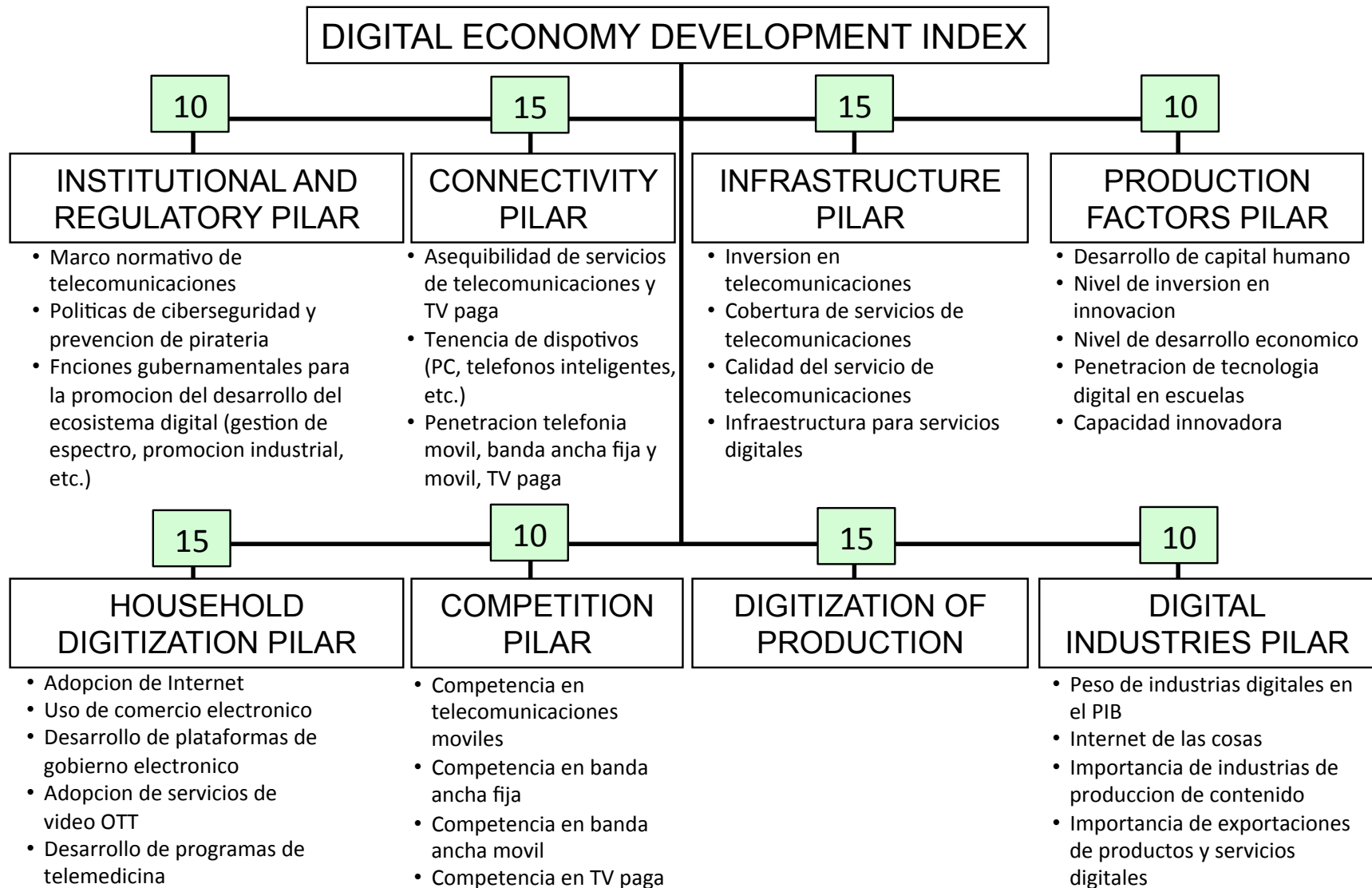


**DIGITAL ADVERTISING REVENUES
(US\$ per capita)**



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

MORE IMPORTANTLY, THE DATABASE ALLOWED THE CONSTRUCTION OF A DIGITAL ECONOMY DEVELOPMENT INDEX



Nota: el número muestra el peso de cada pilar en el cálculo del índice

Source: Observatorio del Ecosistema Digital de América Latina y el Caribe

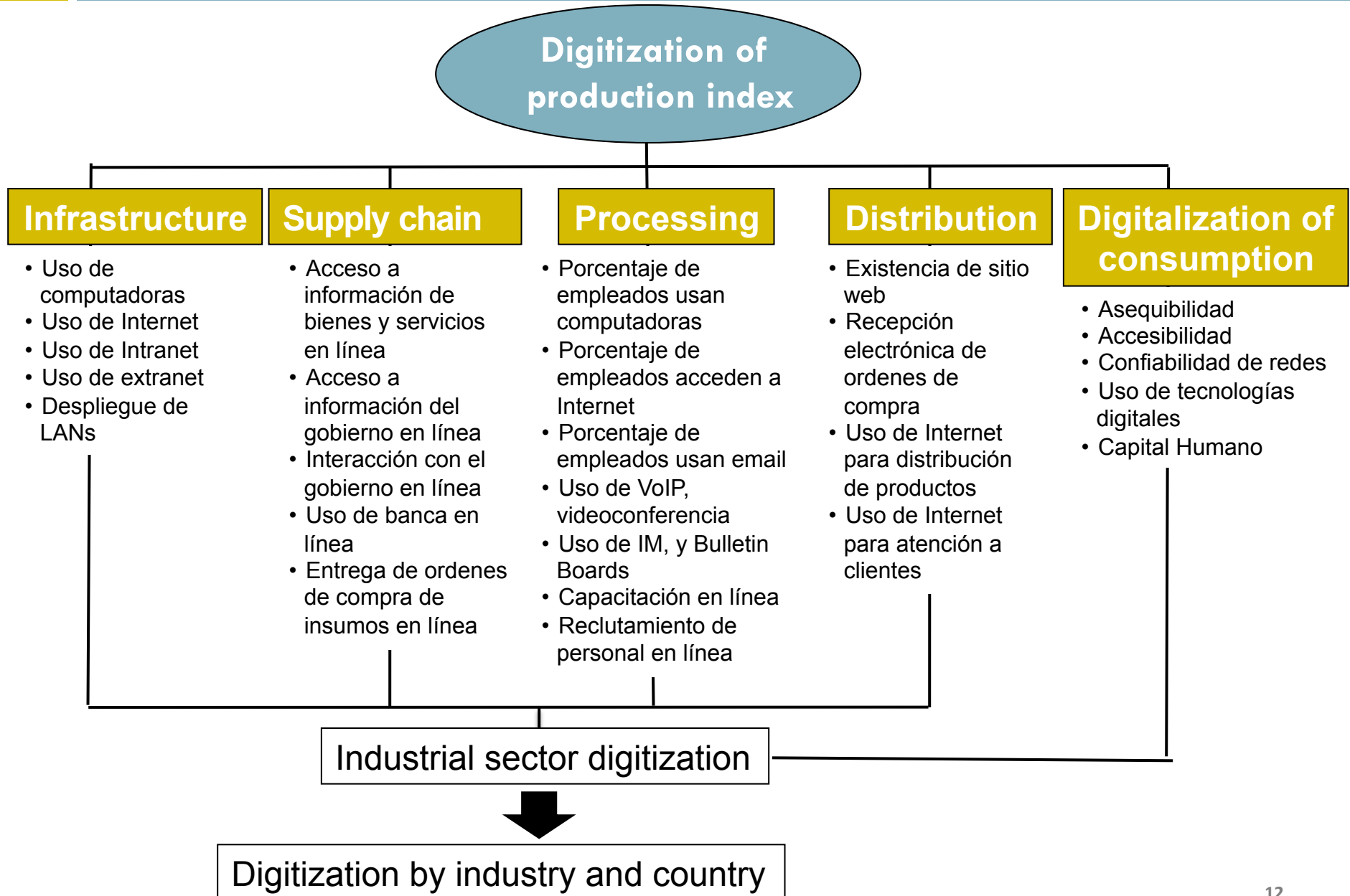
INDEX STRUCTURE BLENDS 55 INDICATORS (THE OTHER 99 WERE FOUND TO BE HIGHLY CORRELATED WITH THE ONES CHOSEN)

COMPONENTS OF THE DIGITAL ECONOMY DEVELOPMENT INDEX

Pilar y peso en el Índice	Componentes	Peso	Numero de indicadores
Infraestructura (15)	Inversión en telecomunicaciones	5.00	1
	Cobertura de servicios de telecomunicaciones	4.00	4
	Calidad del servicio de telecomunicaciones	4.00	7
	Infraestructura para servicios digitales (IXP, servidores)	2.00	3
Conectividad (15)	Asequibilidad de servicios de telecomunicaciones y televisión	5.00	5
	Tenencia de dispositivos (PC, teléfonos inteligentes, etc.)	5.00	3
	Penetración de telefonía móvil, banda ancha fija y móvil, televisión por suscripción	5.00	5
Digitalización de hogares (15)	Adopción de Internet	6.00	3
	Uso de comercio electrónico	3.00	1
	Desarrollo de plataformas de gobierno electrónico	2.00	1
	Adopción de servicios de video OTT	2.00	1
	Desarrollo de programas de telemedicina	2.00	1
Digitalización de la producción (15)	Infraestructura digital de empresas	3.75	1
	Digitalización de la cadena de aprovisionamiento	3.75	2
	Digitalización de procesamiento de materias primas y operaciones	3.75	1
	Digitalización de canales de ventas y distribución	3.75	2
Industrias Digitales (10)	Peso de industrias digitales en el PIB	4.44	2
	Internet de las cosas	1.67	1
	Importancia de industrias de producción de contenido	2.22	1
	Importancia de exportaciones de productos y servicios digitales	1.67	2
Factores de producción del ecosistema digital (10)	Desarrollo de capital humano	2.00	2
	Nivel de inversión en innovación	2.00	1
	Nivel de desarrollo económico	2.00	2
	Penetración de tecnología digital en escuelas	2.00	2
	Capacidad innovadora	2.00	2
Marco Institucional y regulatorio (10)	Políticas de ciber-seguridad y prevención de piratería	5.00	2
	Funciones del gobierno para la promoción del desarrollo del ecosistema digital (gestión de espectro, programas de servicio universal, promoción de la industria de contenidos, etc.)	5.00	2
Nivel de competencia (10)	Competencia en telecomunicaciones móviles	2.00	1
	Competencia en banda ancha fija	3.00	1
	Competencia en banda ancha móvil	3.00	1
	Competencia en TV paga	2.00	1

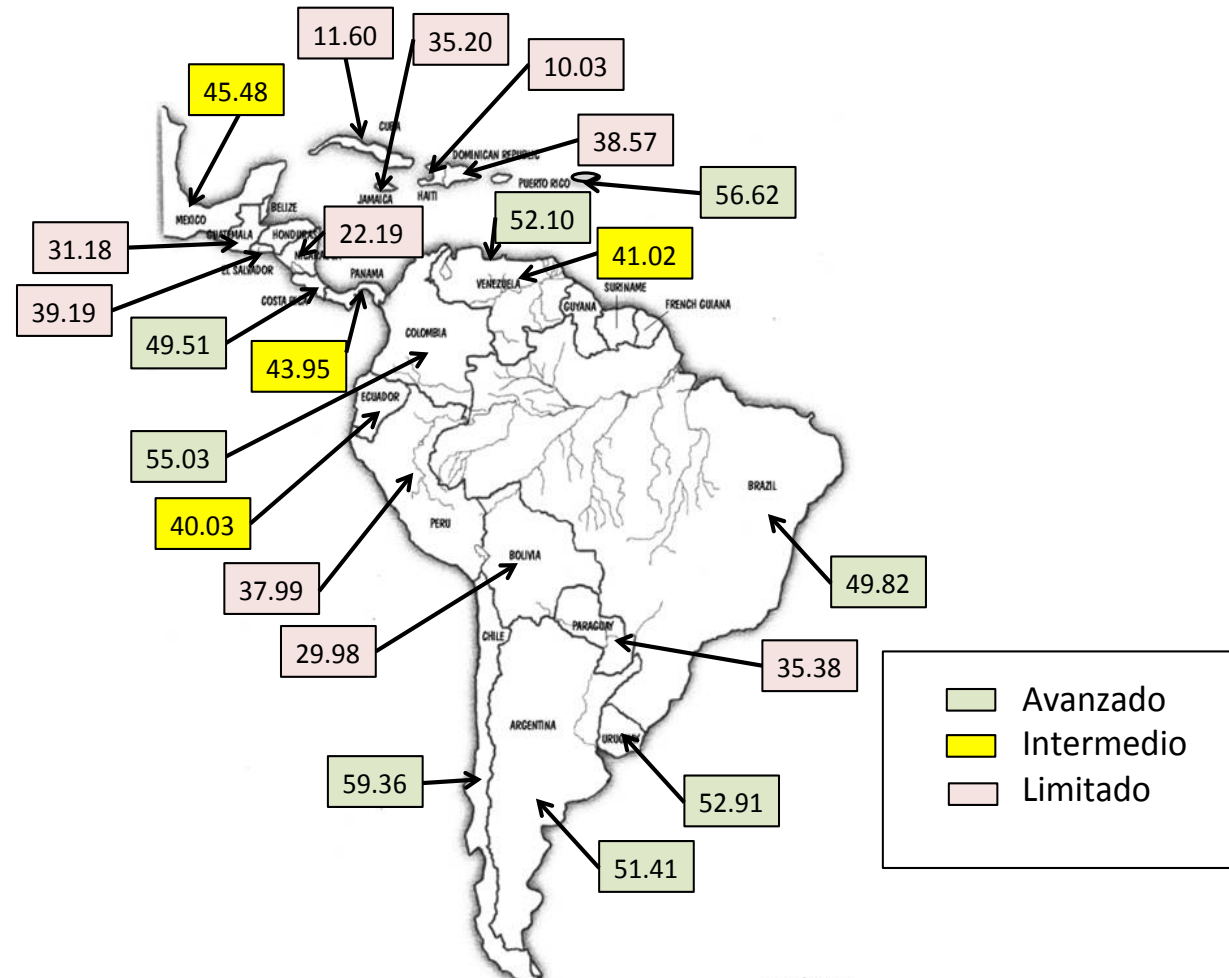
Source: Observatorio del Ecosistema Digital de América Latina y el Caribe

ONE OF THE AREAS CRITICAL TO MEASURE IS THE DIGITIZATION OF PRODUCTION



AT A VERY DESCRIPTIVE LEVEL, THE INDEX PROVIDES US WITH A VIEW OF LEVEL OF DEVELOPMENT OF THE DIGITAL ECONOMY BY COUNTRY

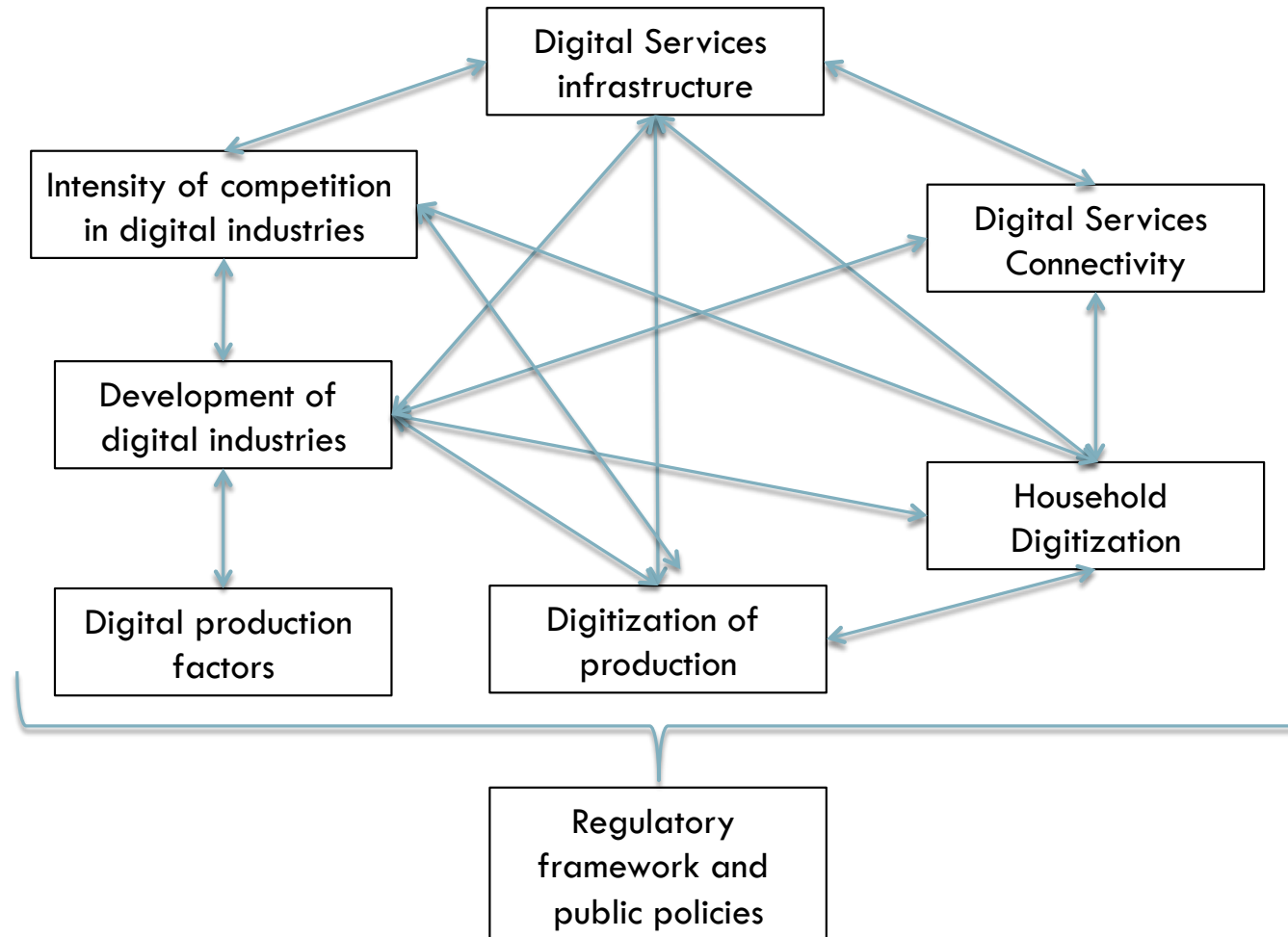
LATIN AMERICA AND THE CARIBBEAN: DIGITAL ECONOMY DEVELOPMENT INDEX (2015)



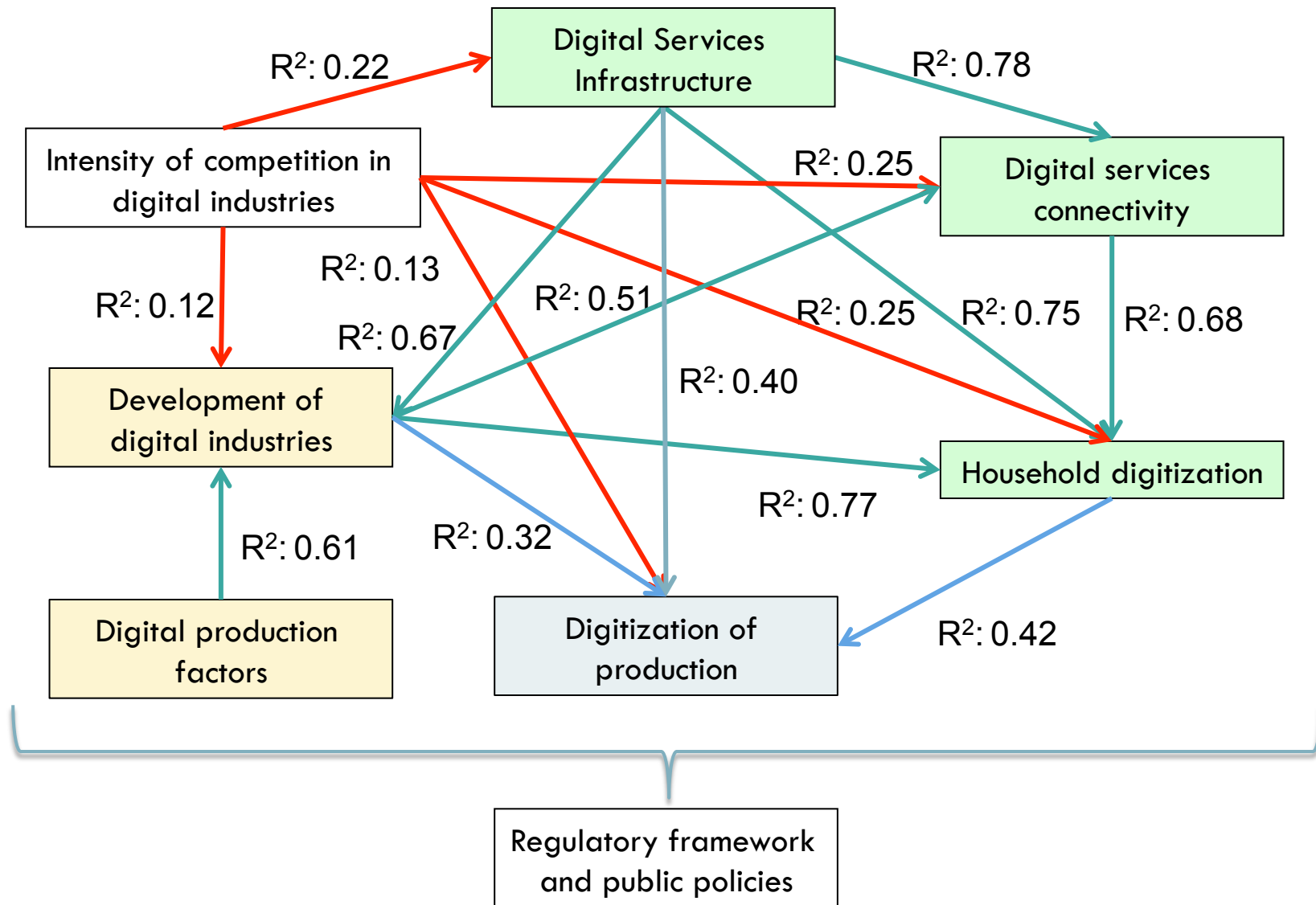
Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

MORE IMPORTANTLY, INDICES DEVELOPED FOR EACH PILLAR PROVIDE A FIRST LEVEL OF UNDERSTANDING OF THEIR INTERRELATIONSHIPS

STRUCTURE OF THE DIGITAL ECONOMY INDEX



THE CALCULATION OF INDICES BY PILLAR FOR 75 COUNTRIES LEADS TO THE IDENTIFICATION OF THE MOST IMPORTANT DIGITAL ECONOMY DEVELOPMENT LEVERS



THE UNDERSTANDING OF INTERRELATIONSHIPS BETWEEN THE EIGHT PILLARS LEADS TO THE IDENTIFICATION OF KEY POLICY LEVERS

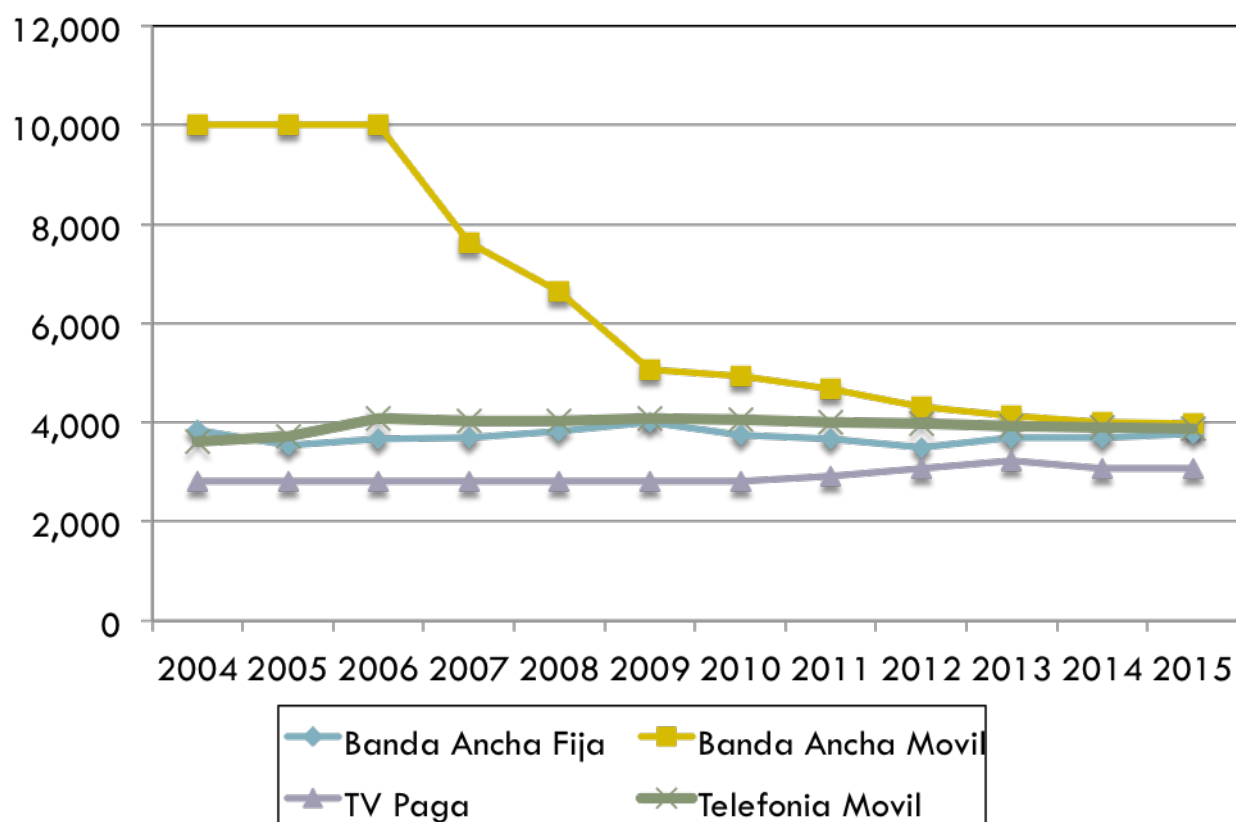
- The development of production factors of the digital economy (more specifically, human capital and innovating capacity) on the growth of digital industries
- The development of digital services infrastructure (backbone networks, fixed and mobile distribution networks, and internet interconnection points) for the development of connectivity, household and production digitization, and the development of digital industries)
- Development of digital industries (digital platforms and content, telecommunications) for the increase of connectivity and household digitization
- Digital services connectivity and the growth of digital industries for the development of household digitization

THE EXISTENCE OF A VIRTUOUS CIRCLE OF RELATIONSHIPS, INDICATES THE LEVERS TO BE MANAGED THROUGH PUBLIC POLICIES

- It links: (1) infrastructure, (2) connectivity, (3) digital industries, and (4) household digitization
- The lack of correlation between competitive intensity with other ecosystem pillars could be due to the fact that most countries already present an adequate level of competitive intensity; therefore, most emerging countries face barriers that go beyond the benefits of competition: the issue of income distribution
- Finally the digitization of production is influenced by the development of infrastructure and growth of digital industries, combined with the demand emerging from household digitization

STATIC COMPETITION LEVEL INDICES APPEAR TO BE CONVERGING ACROSS PLATFORMS

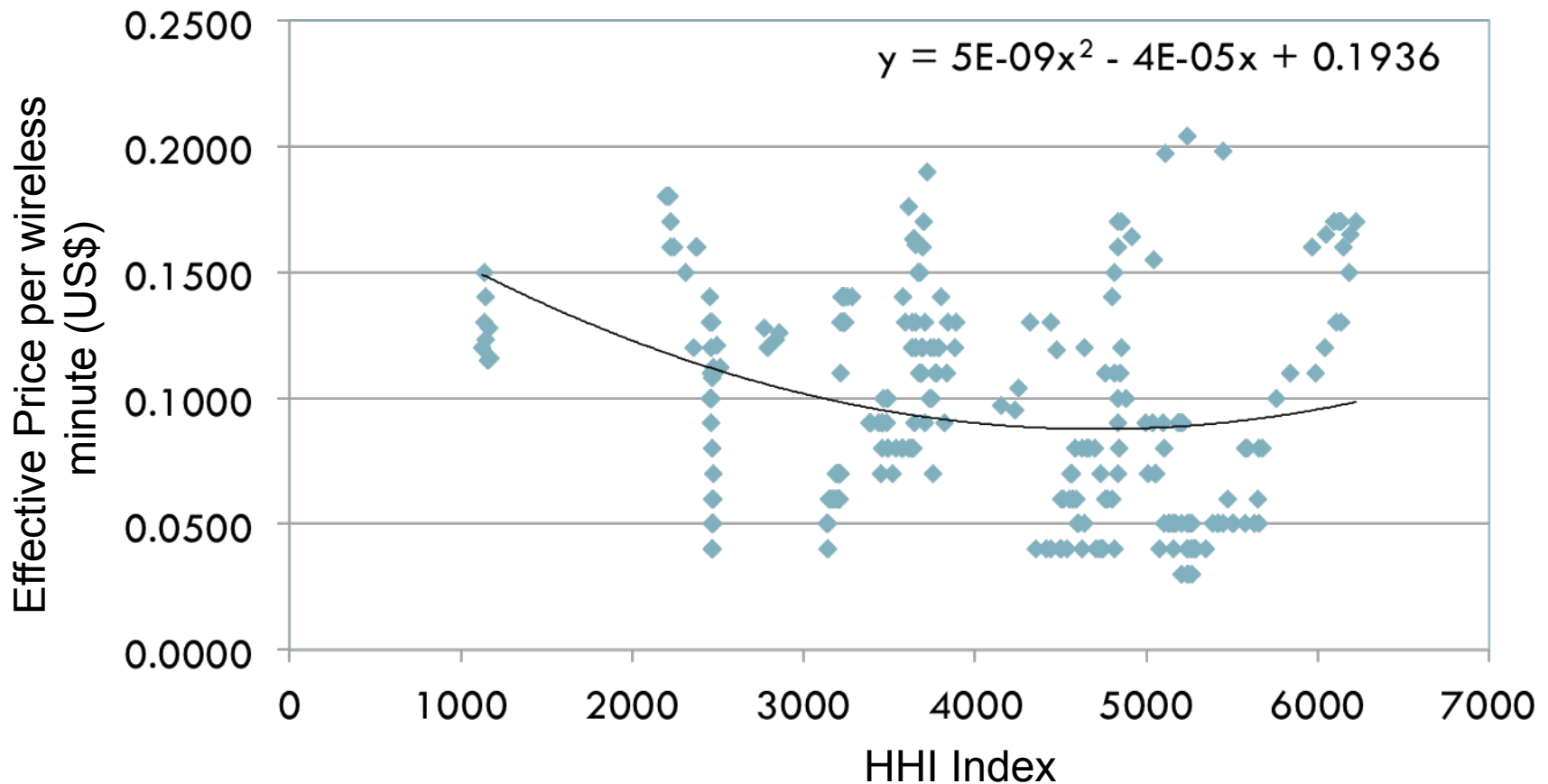
LATIN AMERICA AND THE CARIBBEAN: EVOLUCIÓN DEL ÍNDICE HERFINDAHL-HIRSCHMAN POR SECTOR DEL ECOSISTEMA (2004-2015)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

ILLUSTRATION OF THE “U CURVE” OF INDUSTRY COMPETITIVE INTENSITY

LATIN AMERICA: RELATIONSHIP BETWEEN THE HERFINDAHL-HIRSCHMAN INDEX AND THE EFFECTIVE PRICE PER WIRELESS MINUTE (2004-2014)



Nota: Cada observación se refiere a un mercado nacional en un año determinado

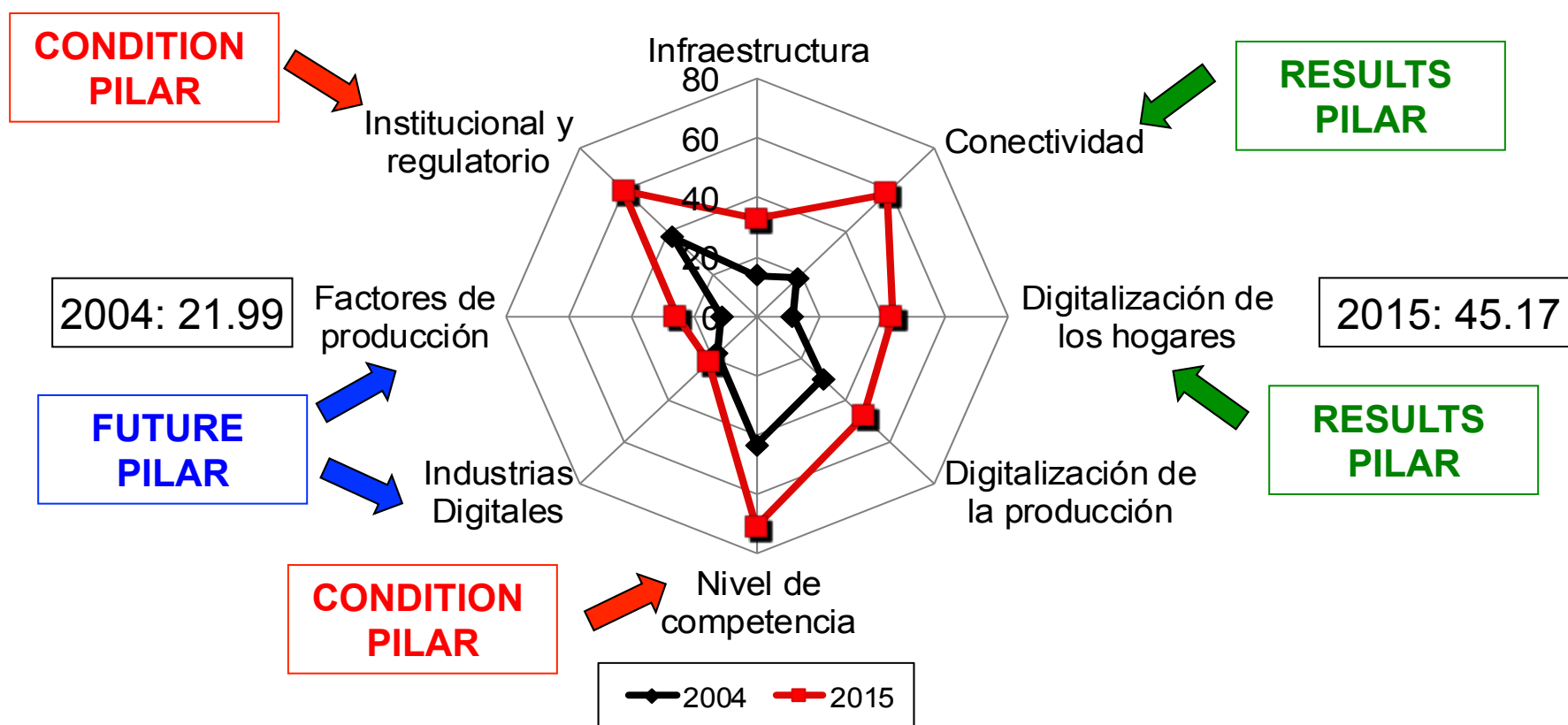
Fuente: GSMA; Bank of América; análisis Telecom Advisory Services LLC

AGENDA

- A theoretical framework to measure the digital economy
- The Latin America and Caribbean digital economy
- Issues of measurement of the digital economy

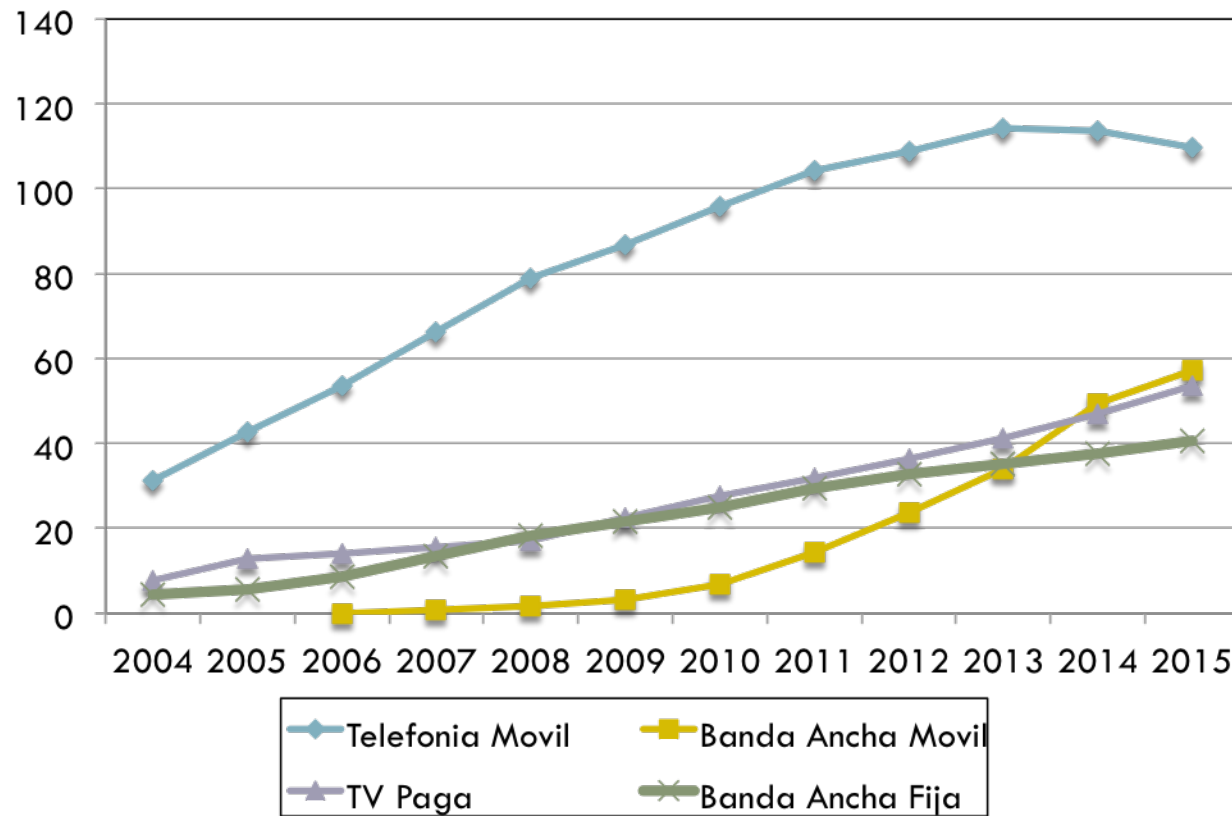
THE AGGREGATE DIGITAL ECONOMY INDEX FOR LATIN AMERICA AND THE CARIBBEAN HAS GROWN 23 POINTS IN ELEVEN YEARS – A 6.76% ANNUAL GROWTH RATE

LATIN AMERICA AND THE CARIBBEAN: DIGITAL ECONOMY DEVELOPMENT INDEX



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

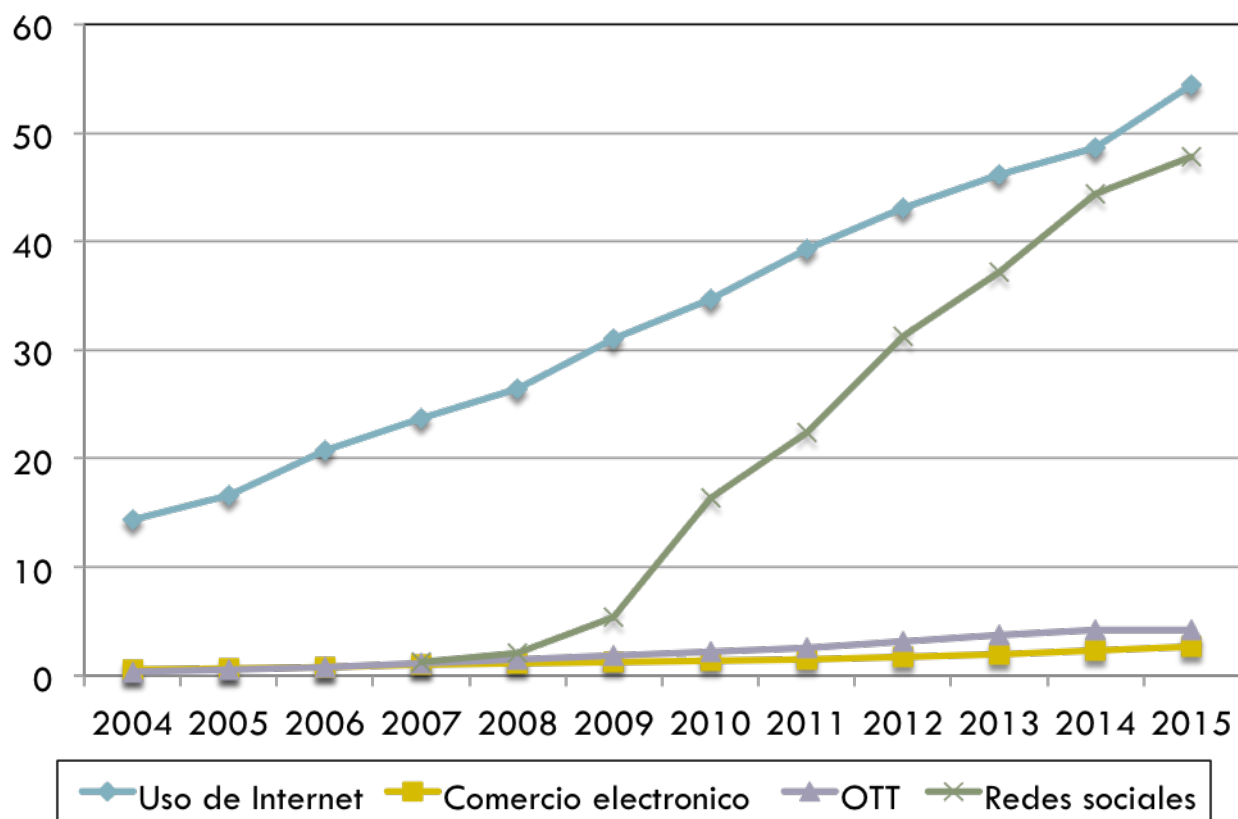
LATIN AMERICA AND THE CARIBBEAN: DIGITAL TECHNOLOGY ADOPTION (2004-2015)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

IT ALSO ALLOWS TO DETERMINE WHAT DRIVES THE GROWTH IN A SPECIFIC PILLAR AND WHAT ARE THE LAGGARDS

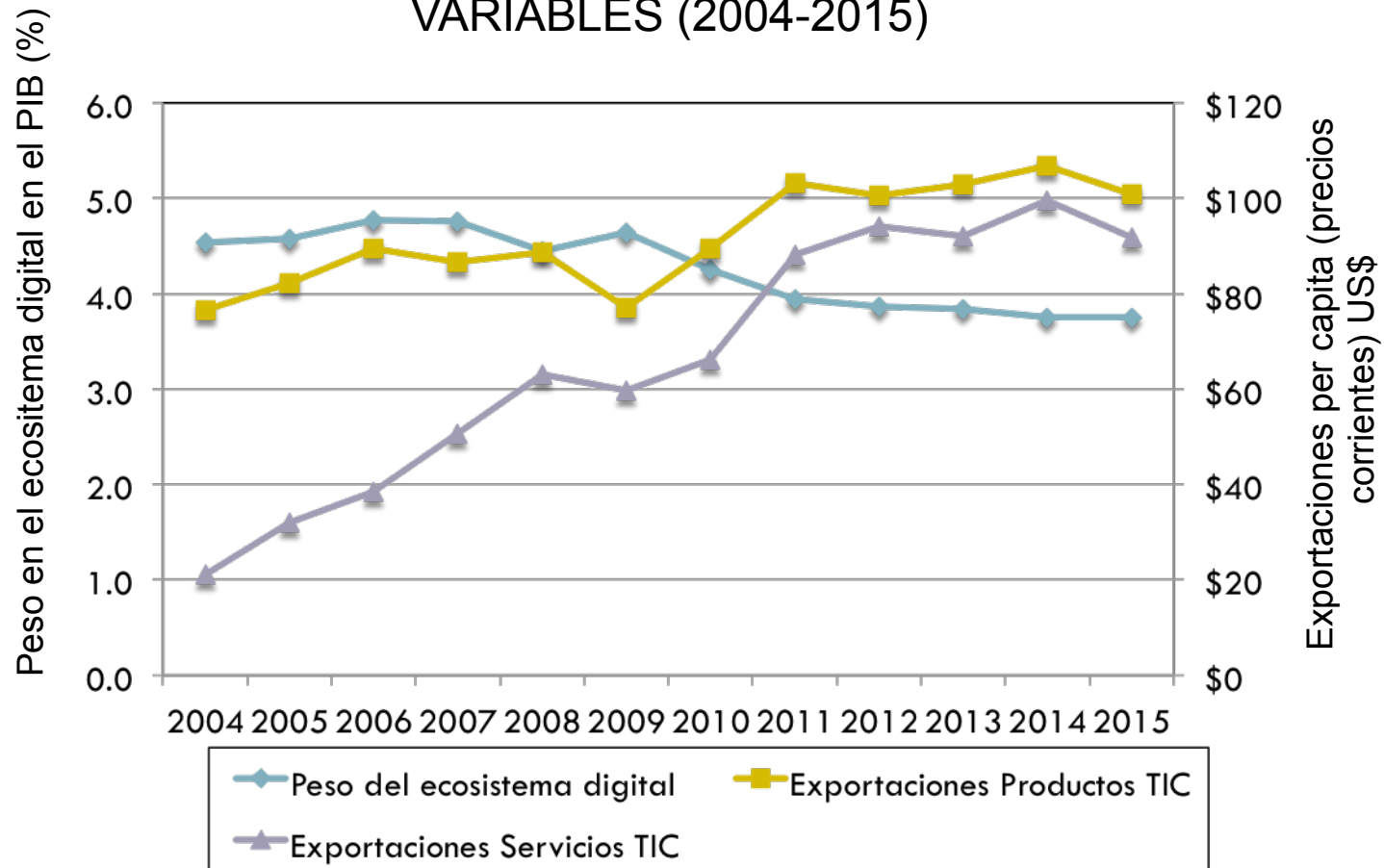
LATIN AMERICA AND THE CARIBBEAN: INDICATORS DRIVING HOUSEHOLD DIGITIZATION (2004-2015)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

IN ADDITION, THE TIME SERIES OF HOMOGENEOUS DATA ALLOWS IDENTIFYING DIGITAL ECONOMY DRIVERS

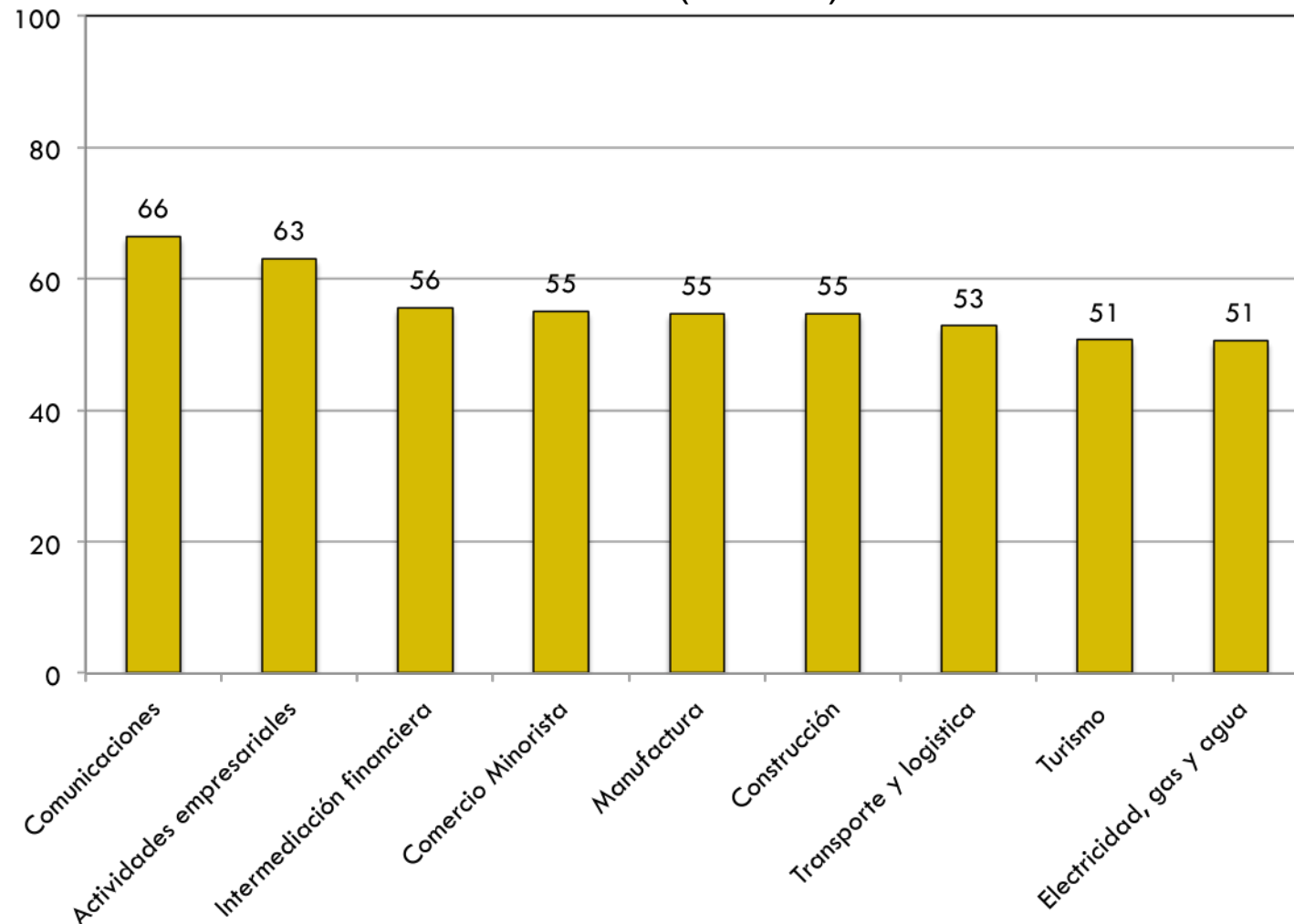
LATIN AMERICA AND THE CARIBBEAN: DIGITAL INDUSTRIES VARIABLES (2004-2015)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

THE PRODUCTION DIGITIZATION INDEX CAN BE USED TO COMPARE SECTOR DEVELOPMENT

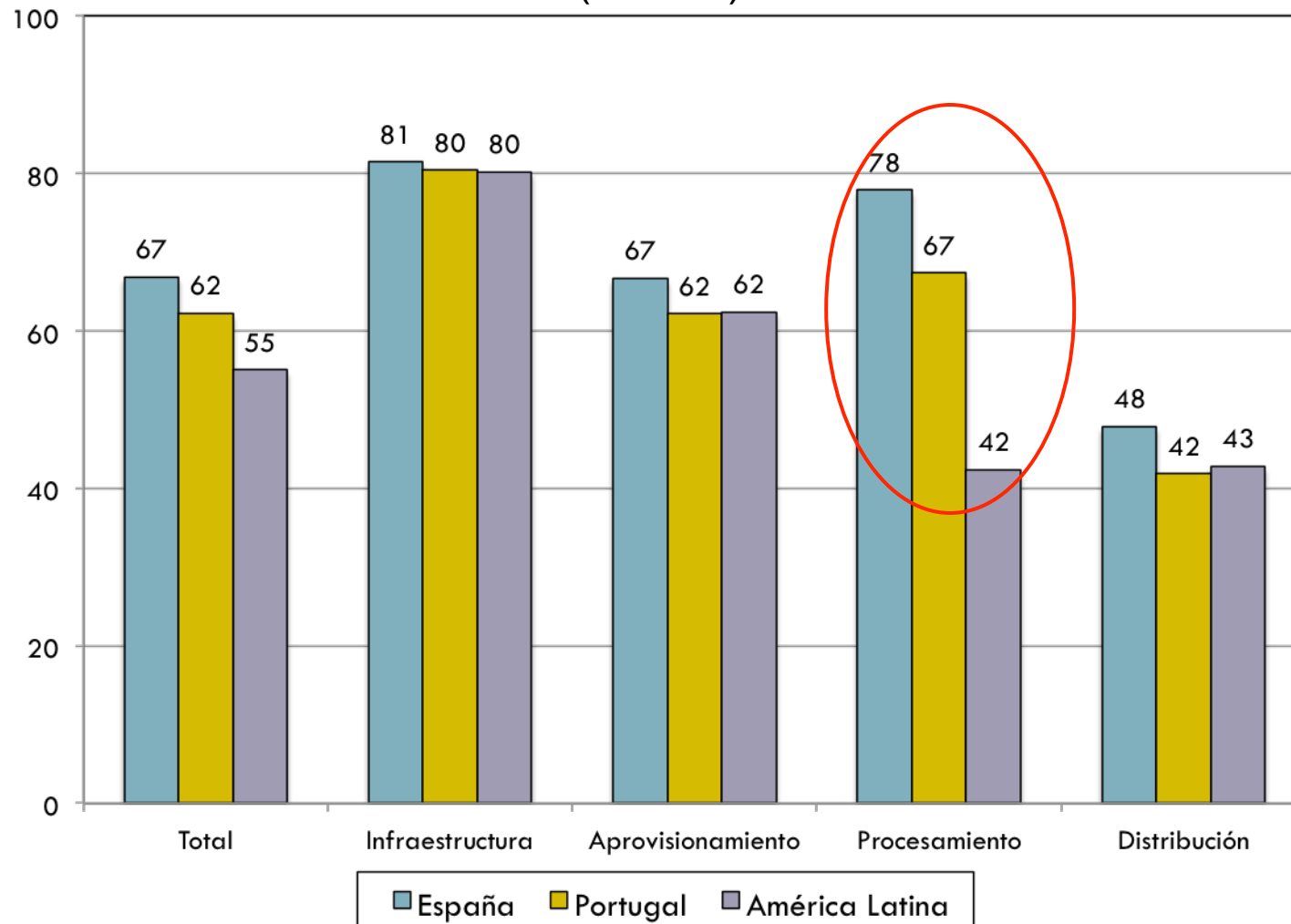
LATIN AMERICA: AVERAGE DIGITIZATION INDEX BY INDUSTRIAL SECTOR (2013-4)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

THE DIGITIZATION INDEX BY VALUE CHAIN STAGE ALLOWS PINPOINTING THE MOST IMPORTANT LIMITATIONS IN LATIN AMERICA

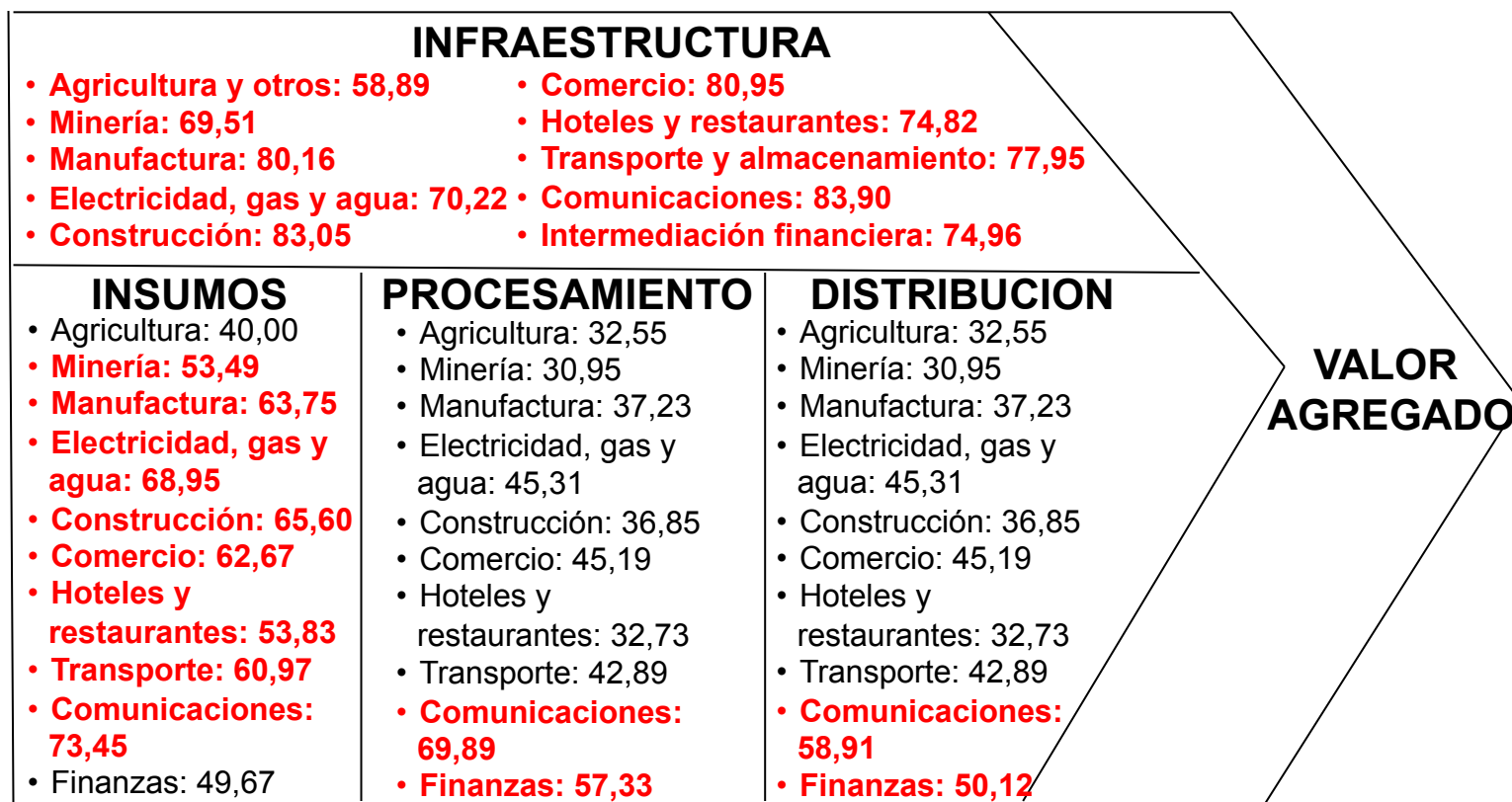
LATIN AMERICA: AVERAGE DIGITIZATION BY VALUE CHAIN STAGE (2013-4)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

THE DIGITIZATION INDEX BY VALUE CHAIN STAGE WOULD APPEAR TO CONFIRM THE HYPOTHESIS OF LIMITS ON INTANGIBLE CAPITAL ACCUMULATION

LATIN AMERICA: AVERAGE DIGITIZATION BY VALUE CHAIN STAGE
(SCALE 0-100) (2013-4)

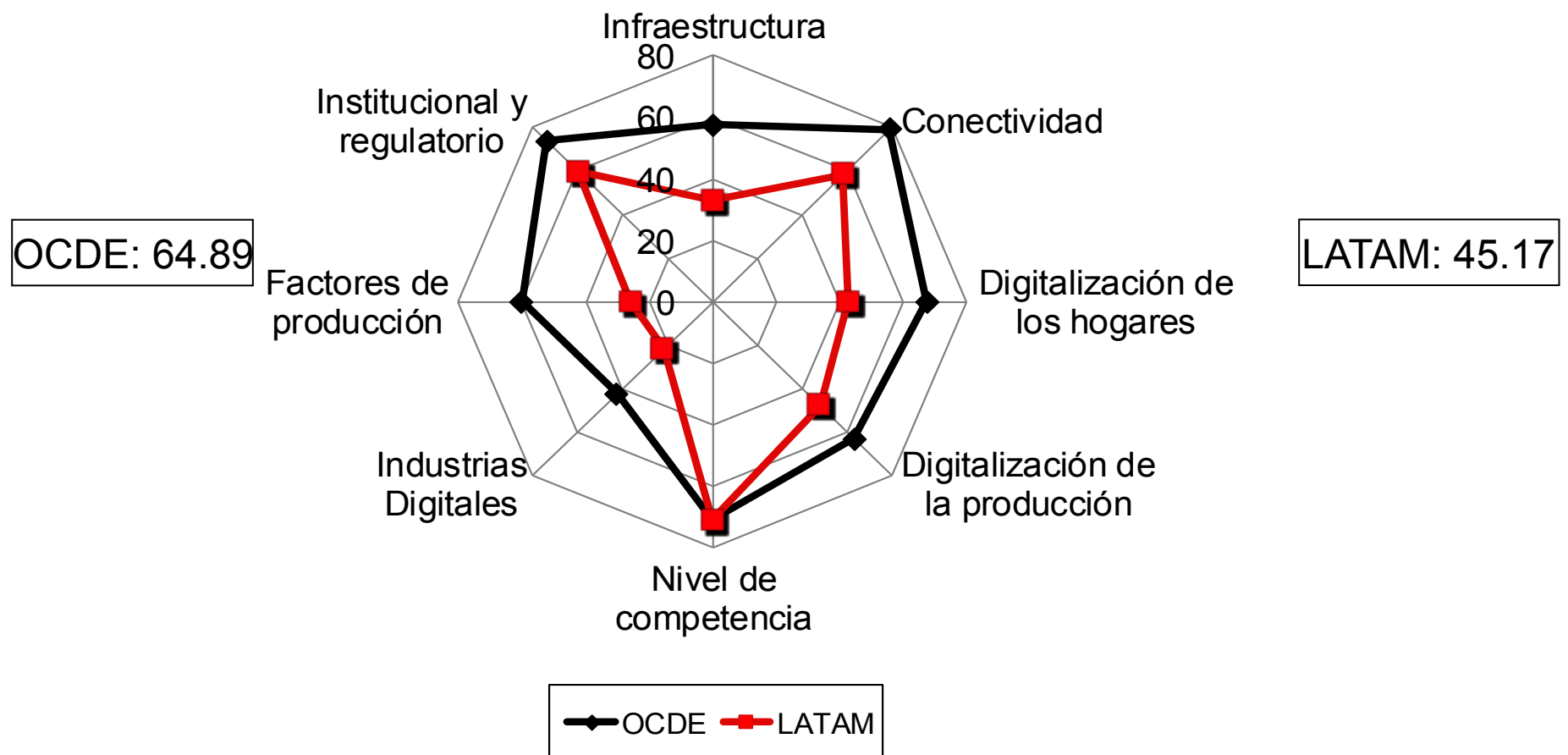


Sectores con índice de digitalización avanzado en negrita

Fuentes: EIT-INDEC (Argentina); CETIC (Brasil); Instituto Nacional de Estadísticas (Chile), Tercera Encuesta Longitudinal de Empresas; INEGI (México), Censo Industrial Nacional; DANE (Colombia), Indicadores Básicos de TIC en Empresas; análisis Telecom Advisory Services

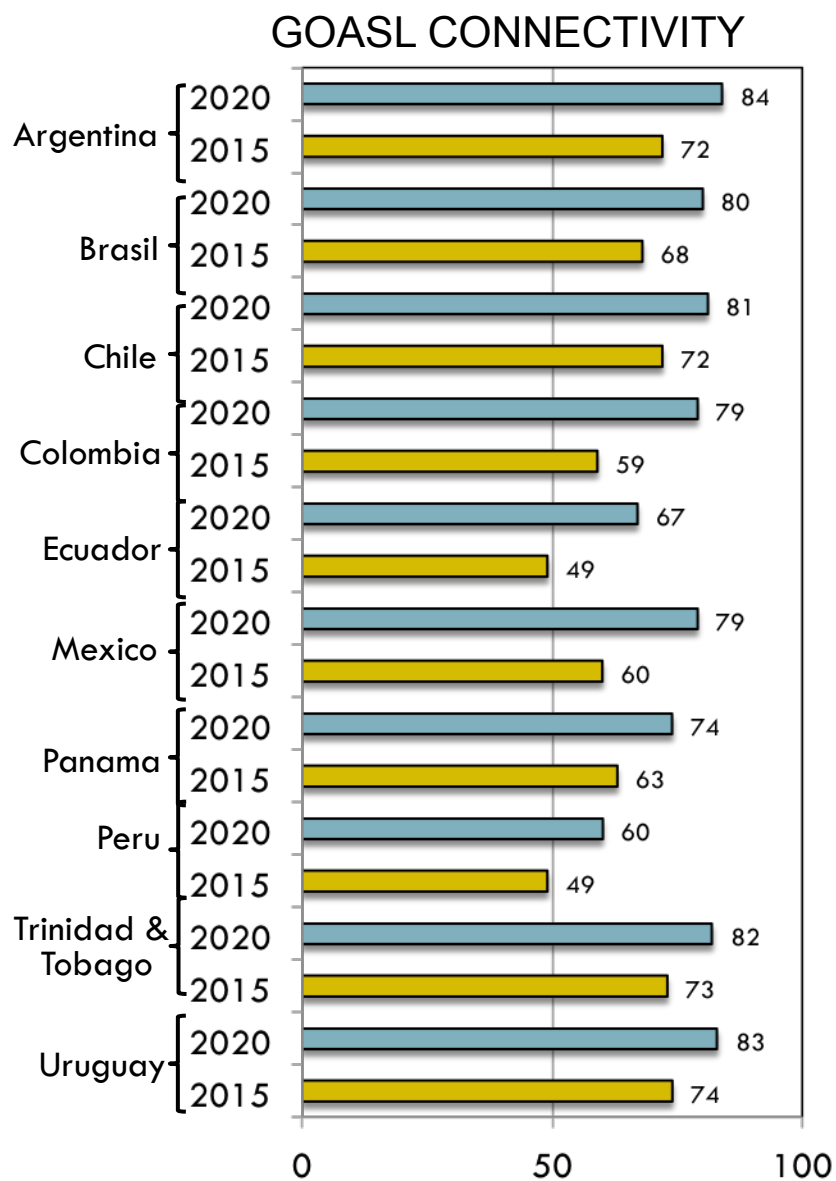
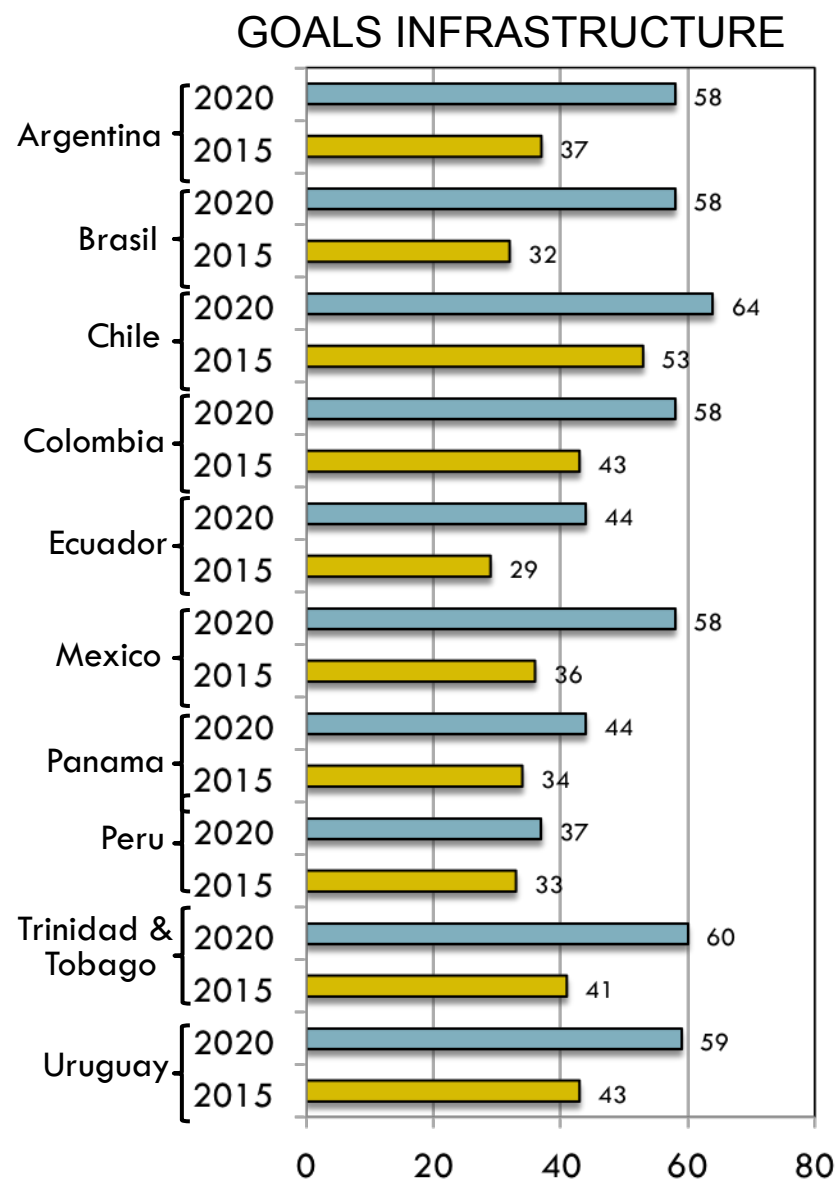
THE DEFINITION OF DEVELOPMENT GOALS IS ALSO PART OF THE OBSERVATORY, AND IS BASED ON MESURING THE GAPS WITH THE DEVELOPED WORLD

LATIN AMERICA VS. OCDE: DIGITAL ECONOMY DEVELOPMENT INDEX (2015)



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

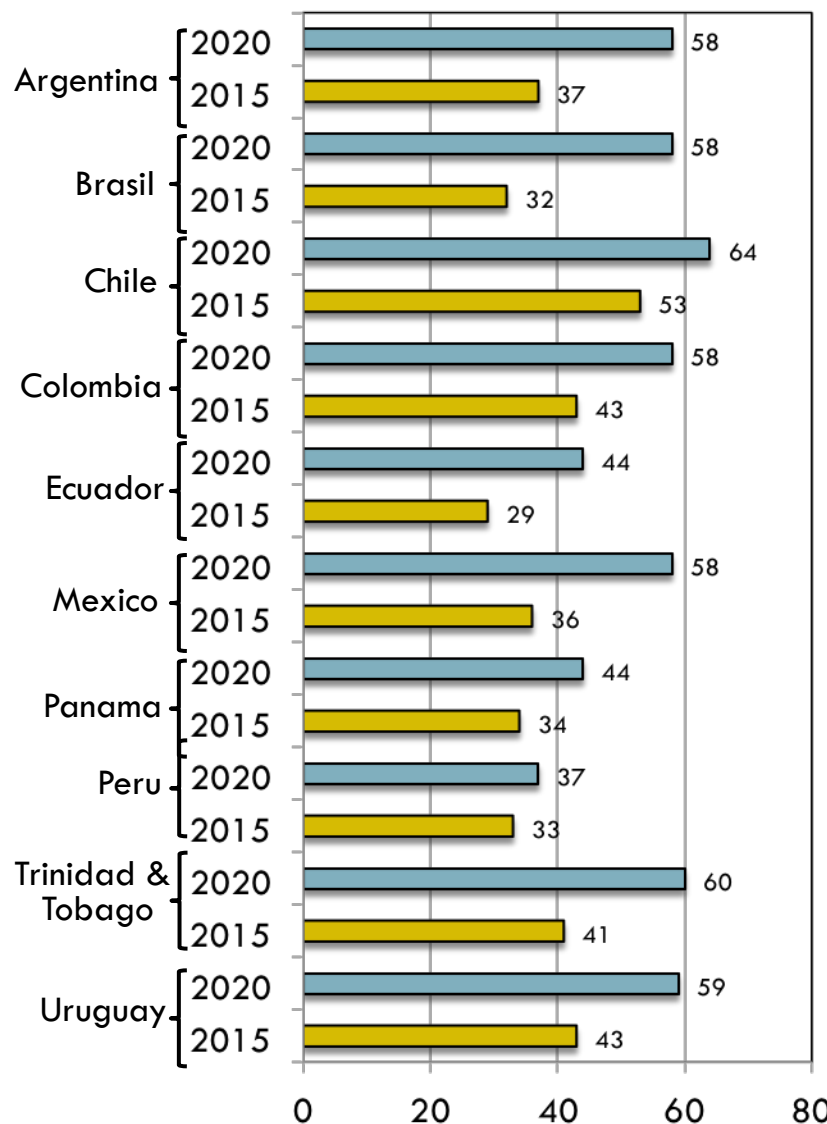
THE SIZING OF THE GAPS BETWEEN LATIN AMERICA AND THE DEVELOPED WORLD LEADS TO THE ESTABLISHMENT OF GOALS



Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

IN TURN, EACH GOAL IS DISSAGGREGATED IN SPECIFIC TARGETS

GOALS INFRASTRUCTURE



COUNTRY		Investment telecom per capita (US\$)	Connections Fiber Optic (%)	Coverage 4G (%)
Argentina	2015	\$ 437	1.88 %	65 %
	2020	\$ 852	18.44 %	90 %
Brasil	2015	\$ 433	8.18 %	57 %
	2020	\$ 852	19.29 %	87 %
Chile	2015	\$ 1,131	26.20 %	76 %
	2020	\$ 1,131	26.20 %	90 %
Colombia	2015	\$ 601	1.63 %	81 %
	2020	\$ 852	19.29 %	90 %
Ecuador	2015	\$ 195	48.88 %	50 %
	2020	\$ 634	48.88 %	72 %
Mexico	2015	\$ 422	9.46 %	58 %
	2020	\$ 852	19.29 %	90 %
Panama	2015	\$ 540	4.78 %	10 %
	2020	\$ 634	7.35 %	72 %
Peru	2015	\$ 361	0.58 %	62 %
	2020	\$ 462	8.02 %	62 %
Trinidad & Tobago	2015	\$ 386	23 %	65 %
	2020	\$ 852	23 %	89 %
Uruguay	2015	\$ 574	59.74 %	60 %
	2020	\$ 852	60.00 %	90 %

Source: Observatorio del Ecosistema Digital de América Latina y el Caribe; Telecom Advisory Services analysis

AGENDA

- A theoretical framework to measure the digital economy
- The Latin America and Caribbean digital economy
- Issues of measurement of the digital economy

SOURCES (I)

Entity	Document / data base
GSMA	• GSMA Intelligence • Mobile Connectivity Index
Business Bureau	• Pay TV & Multiscreens market
PWC	• Global entertainment and media outlook 2009–2013 • PwC Global outlook 2014-2018
International Telecommunications Union	• Measurement the Information Society • ITU World Telecommunication/ICT Indicators (WTI) database 2016 • ICT Eye 2016 • UIT Regulatory Tracker 2014 • Índice mundial de ciberseguridad y perfiles de ciberbienestar de la UIT 2015
World Bank	• Indicadores del desarrollo mundial
Owloo	• Información disponible en sitio web
CEPAL	• Comisión Económica para América Latina y el Caribe - Sistema de Información Estadístico de TIC - http://www.eclac.org/tic/flash/
Eurostat	• Eurostat database
ONU	• E-governo index report
Euromonitor	• Euromonitor from trade sources/national statistics

SOURCES (II)

Entity	Document / data base
UNCTAD	• UNCTADStats • UNCTAD B2C E-COMMERCE INDEX 2016 • Information Economy Report 2015
World Health Organization	• Global Observatory for eHealth series - Volume 1
Covergencia Research	• Regional Players Map
Dataxis	• Información de reportes varios
INSEAD	• Global Innovation Index 2016
UNESCO	• UNESCO Dataset
EPO	• EPO statistics
World Intellectual Property Organization	• WIPO statistics database
USPTO	• U.S. PATENT AND TRADEMARK OFFICE, Patent Technology Monitoring Team (PTMT)
Cet.la	• Libro “El Ecosistema y la Economía Digital en América Latina”
BSA. The software alliance	• Piracy study
CAF	• Índice IIDTIC CAF 2013

MANIPULATION, DEALING WITH OMITTED DATA POINTS

País	2000	2001	2002	2003	2004	2005	2006	2007
Argentina	1,904,000,000	869,000,000	..	..	690,811,398	741,440,471	1,073,441,270	1,165,990,166
Barbados	26,917,000	26,821,500	44,112,000	25,648,500	30,165,000	24,845,000	23,741,500	..
Bolivia	171,458,285	158,310,666	25,600,000	25,800,000	17,700,000	133,053,534	200,394,915	291,088,548
Brasil	8,852,459,016	6,525,423,729	5,205,479,452	2,922,077,922	4,744,027,304	6,369,453,041	5,779,987,559	7,775,461,974
Chile	1,116,796,519	827,720,730	562,261,226	349,158,921	453,826,625	601,354,909	1,198,074,584	1,393,175,785
Colombia	1,453,675,942	1,530,246,170	..	..	206,902,698	892,059,313	1,702,567,260	1,117,316,282
Costa Rica	118,608,651	233,061,696	249,105,108	266,974,364	169,098,154	..	144,294,421	305,322,668
Cuba	116,400,000	143,700,000	111,000,000	76,000,000	70,000,000	93,630,000	..	73,935,001
Ecuador	..	..	..	..	58,098,592	123,086,344	176,668,708	162,813,840
El Salvador	875,626,874	163,111,876	76,800,000	23,314,286	124,571,429	95,000,000	137,931,884	337,289,357
Guatemala	..	..	..	..	..	..	..	..
Haití	..	..	..	..	..	..	..	..
Honduras	49,662,399	25,928,378	52,955,569	104,092,219	131,070,840	115,705,207	189,731,259	332,586,843
Jamaica	212,059,676	159,644,583	189,581,170	246,007,530	181,726,781	167,357,600	149,323,292	193,609,227

MAINTENANCE IS A CRITICAL CHALLENGE OF THE OBSERVATORY AND THE INDEX

- La UIT publico una versión revisada de su base el 15 de enero de 2017. La misma contiene revisiones mínimas de datos históricos e información adicional al 2015 (esta información eran datos omitidos en la versión publicada en junio del 2016)
- El Banco Mundial actualiza sus datos cada tres meses, y por lo tanto ha publicado una nueva versión
- Akamai reporta datos trimestralmente, y, si bien no revisa sus datos históricos, ya tiene datos para el 2016
- El portal de banda ancha de la OCDE ha publicado una nueva versión el 2 de febrero
- La GSMA actualiza datos permanentemente
- Digitalización de la producción: la cobertura actual de información incluye Argentina, Brasil, Chile, Colombia, México, y los países europeos. Sin embargo, existen bases de microdatos (encuestas industriales) para Ecuador, Paraguay, Perú y Costa Rica, cuyo análisis requiere análisis detallado
- Cuotas de mercado de banda ancha fija: si bien la cobertura de países de América Latina está suficientemente actualizada, la misma en el resto del mundo refleja datos a finales del 2012; si bien estos datos tienen una gran inercia, sería conveniente actualizar la serie para lo cual se debe acceder a los sitios de cada regulador de los países analizados
- Competencia de OTT: nuestra búsqueda indica que sería más beneficioso reemplazar el indicador de cuota de buscadores por el de redes sociales, donde existen más datos
- Análisis de contenidos locales: al momento, se está usando un indicador disponible (artículos locales de Wikipedia); sin embargo, nuestra experiencia indica que sería más conveniente hacer un análisis de la base de Alexa que captura los contenidos más populares de Internet de acuerdo al origen para cada país. Sin embargo, su análisis requiere un trabajo detallado.

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