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LAC PARTICIPATION IN THE DIGITALLY ENABLED BUSINESS PROCESS-RELATED SERVICES ECOSYSTEM

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LAC Participation in the Digitally Enabled Business Process–Related Services Ecosystem

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Abstract

This report defines and describes the global digital business process– related services ecosystem, presents Latin American and the Caribbean (LAC) countries' participation, and provides considerations for increasing participation. From a global perspective, the LAC region is viewed as an offshore destination for cost reduction and workforce availability rather than innovation. Export-oriented foreign investors are primarily shared services centers and third-party providers of contact center services. Opportunities for LAC to contribute significantly to the global digital services ecosystem are unlikely, at least in the short to medium term, given the dominance of U.S. technology firms and LAC's limited participation in terms of supply and demand. Increasing use of digital technologies and services and supporting regional firm development are more feasible objectives. LAC firms may be able to reach a global audience in niche areas based on local expertise and partnerships with global digital firms.

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Abbreviations

AI	artificial intelligence
BaTIS	Balanced Trade in Services
BP	business process
BPO	business process outsourcing
CIP	charges for intellectual property
CSP	cloud service provider
DDS	digitally delivered services
EU	European Union
FDI	foreign direct investment
FS	financial services
GDP	gross domestic product
IaaS	Infrastructure as a Service
ICT	information and communication technology
IPS	insurance and pension services
IT	information technology
ITU	International Telecommunication Union
KP	knowledge process
KPO	knowledge process outsourcing
LAC	Latin America and the Caribbean
Mbps	megabits per second
MNE	multinational enterprise
n.i.e.	not included elsewhere
OBS	other business services
OECD	Organisation for Economic Co-operation and Development
PaaS	Platform as a Service
PCR	personal, cultural, and recreational services
PICT	potentially information and communication technology–enabled
PMC	professional and management consulting
SaaS	Software as a Service
SSC	shared services center
STEM	science, technology, engineering, and math
TCI	telecommunications, computer, and information services
TTOBS	technical, trade-related, and other business services
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

1. Overview

This report provides definitions of the global digital services ecosystem. It presents data and analysis of Latin American and the Caribbean's (LAC's) participation and discusses the potential for LAC to increase participation in regional and global chains.[1] Lastly, it provides considerations to increase participation by type of investor, business model, and segment. Digital service has many potential definitions. In this report, it refers to digitally enabled, indicating the service is performed using information technology (IT) hardware (electronic devices) and software. Within services, the focus is on services related to business processes (BPs).

IT and BP services are non-revenue-generating activities of a firm. When they are traded, it is often between affiliated entities, and the bulk of global trade is among high-income countries. India is the only middle-income country with a significant footprint in the global value chain. Demand for traded IT and BP services is concentrated in developed countries. U.S. and European firms establish captive service centers in key geographic regions or outsource some activities to third-party service providers. These third-party providers are primarily U.S., European, or Indian owned, with offices globally to provide services to other multinational firms in the region and to large domestic firms.

LAC has been a prominent destination for shared services centers (SSCs) and third-party providers of contact center services. Cost reduction, workforce availability, and an acceptable business environment have been key factors in attracting export-oriented foreign investment to the region. The global BP workforce faces competition from robotic process automation software. However, there will continue to be short- to medium-term opportunities for LAC, given predicted declines in the U.S. workforce over the next decade and the inability of software to perform all human tasks.

Global third-party IT service providers also have locations in LAC to provide services to large foreign firms with global footprints and to domestic firms, particularly in the financial sector. This segment will become more important in LAC as domestic companies increase usage of DDS.

Costa Rica, Mexico, and Colombia are the primary participants in export-oriented global value chains driven by lead firms. These countries have purposefully attracted foreign investment for export-oriented services largely to the United States by marketing and branding their countries to potential investors, providing investment incentives and an adequate, cost-effective labor force and business environment. Brazil's foreign investors primarily provide services within Brazil. Chile, Mexico, and Brazil have several domestic IT firms that service the domestic market. Argentina has a mix of foreign investors and domestic firms with a regional focus. Uruguay has several branch offices of regional firms and a sizable base of IT firms.

Lack of digital skills is a common perceived weakness of Latin America in global evaluations of offshore services destinations. Digital skills are relevant across all levels of education from primary school to advanced university studies. **Expanding advanced**

[1] Throughout this paper, references to LAC (41) trade cover those countries considered LAC in United Nations Conference on Trade and Development (UNCTAD) trade data as follows; these countries were also used to create groups in Organisation for Economic Co-operation and Development (OECD) data: 12 countries from South America (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela), 8 countries in Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama), and 21 Caribbean economies (Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Montserrat, Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, St. Maarten, Trinidad and Tobago, and Turks and Caicos).

digital skills—particularly programming and math—at the tertiary and post-tertiary levels is important to increase participation in IT services, software, advanced analytics, artificial intelligence (AI), and machine learning. Intermediate digital skills associated with using software and technology are important for the BP segment. Ensuring the general population has basic digital skills will increase use of digital technology and, resultantly, demand for digital business services regionally.

LAC countries have a foundational base to increase participation, including a generally educated workforce, IT infrastructure, adequate business environments, and strategic plans, but generally lack strong marketing efforts or compelling drivers to encourage foreign firms to outsource or offshore activities in the region. There is also limited regional demand to drive significant foreign or domestic investment. Globally, the region is perceived as an offshore destination for cost reduction and workforce availability rather than innovation. Increasing regional demand for digital services and expanding the workforce with advanced digital skills are important areas for improvement. Once established, some LAC firms may be able to reach a global audience in niche areas based on local expertise and via partnerships with global digital firms.

2. Defining Digital Services

Defining digital services as well as valuing service activities is a challenge. Analysis suffers from a myriad of definitions and a dearth of detailed national data. During the 2000s and particularly in the aftermath of the financial crisis (2008–2009), the world became more aware and interested in offshoring and outsourcing manufacturing as well as services. Rapid evolution of IT infrastructure has enabled firms to unbundle their corporate business function activities (such as customer support, finance and accounting, human resource management, procurement operations, and IT services) and perform them in other locations and by other firms. Market reports and academic literature use the terms IT/information and communication technology (ICT) services, IT-enabled services, business process outsourcing (BPO), and offshore services to refer to technology-enabled business-related services that can be outsourced or offshored.[2] Defining these terms using international classification systems began with identifying ICT and potentially ICT-enabled (PICT) trade activities in the 2010s. Over the last five years, the term "digital" has been increasingly used instead of "information technology," and the scope of services included has expanded to digitally deliverable services (DDS). Current definitions of PICT and DDS are much broader than just IT and BPO (Box 1). This report does not include all DDS; it limits analysis to digitally enabled BP-related services, as described below.

"Digital service" may imply the service is digitally deliverable or digitally enabled. Digitally deliverable indicates the service can be transferred or accessed via electronic devices and communication networks. Digitally enabled shifts emphasis to how the service was performed (and often improved) by using IT hardware (electronic devices) and software, which often results in a DDS. This report focuses on digitally enabled services.

Within services, this report focuses on BP-related services—activities that facilitate a firm's operations but are not the primary output or revenue generator. These are divided

[2] See [35] and [41] for early offshore services reports.

into three segments: IT, BP, and knowledge process (KP) services. Within KP services, the focus is on software and services related to data analytics.

The United Nations Conference on Trade and Development (UNCTAD),[3] the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD), and others[4] provide trade in services data by country to the world based on reported or estimated data from national statistics offices. Most countries report or estimate trade for the 12 main service categories (referred to as level 1 or L1 in this report). Two of the 12 main categories—telecommunications, computer, and information services (TCI) and other business services (OBS)—are used to proxy global trade in this report, but with limitations regarding detail and bilateral trade.

Classification systems exist at more detailed level 3 (L3) and level 4 (L4) categories, but few countries report at these levels. At least these levels of detail would be necessary to create an activity-specific picture of trade in IT and digital BP-related services. This report identifies the subcategories most likely relevant to digital BP services and includes some analysis of country participation when data are available. Table A.1 provides trade values at different levels of detail using different sources and definitions of digital services.

The Balanced Trade in Services (BaTIS) dataset by WTO and OECD estimates services trade between countries across the 12 standard Balance of Payments (BPM6) service categories. BaTIS is necessary to estimate bilateral trade because only 65 economies reported full or partial trade in services bilaterally in 2021 [52].[5] Balanced and reported data result in the same set of top traders, but there are often significant differences between the reported values and balanced values, particularly for top traders in digital categories. In fact, the TCI category has the most sizable reported and balanced value difference among the 12 categories (Table A.1). This creates differences in estimates of market share and discrepancies between balanced values used to discuss trading partners and reported data used to discuss more detailed activities. This report primarily uses values and market share data based on the BaTIS dataset, and when available, reported data at more detailed levels to describe country activities.

It is also important to keep in mind that cross-border trade is not necessarily the dominant business model in IT and BP services. These services are also carried out in-house, or by foreign service providers that set up locally to provide services. Furthermore, trade that does occur is often between affiliated entities; tracking and valuing internal business functions conducted in-house but offshore is a challenge for national statistics offices.

Throughout the report, data from market reports and firms' financial statements are used to supplement and validate information from national sources and to provide a more comprehensive picture of the digital ecosystem.

The United States produces detailed service trade data that separates trade values between affiliated and unaffiliated entities. It also publishes data on the value of services

[3] UNCTAD's data correspond to the concepts and definitions of the International Monetary Fund (IMF) Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6, 2009). When possible, values missing in international sources are estimated by using growth rates derived from the data available in national or other international sources.

[4] IMF Balance of Payments Standard Presentation by Indicator: Current Account, Goods & Services, Services, Credit values are like UNCTAD service exports [45].

[5] Data are available from 2005 to 2021, but prior to 2015 more are estimated (in 2005 only 30% of the total value of trade in services was bilaterally reported). In 2021, 65% of the value of services trade was bilaterally specified.

provided by U.S. foreign direct investment (FDI) in foreign countries, and the value of services provided by FDI in the United States.

U.S. trends are relevant given the country is the most significant importer and exporter of digital business services globally, and the United States is LAC's most important trade partner. U.S. data suggest locally outsourcing services (from foreign or domestic providers) rather than cross-border trade is more prominent for digital IT and BP services.[6] Of the two, cross-border trade is more common for business services than IT services, and is more often between affiliated (that is, captive) rather than unaffiliated entities.[7] TCI imports are from affiliated entities, while exports go to unaffiliated entities.[8] Furthermore, IT and BP-related activities are necessary to keep a company running, but are not revenue generating [82]. When these services are provided in-house or traded between affiliated entities, the valuation is primarily the cost of labor.

Box 1. Alternative Definitions: Digitally Deliverable Services

The Handbook on Measuring Digital Trade defines digitally delivered trade as all international trade transactions that are delivered remotely over computer networks; only services can be digitally delivered [46]. The United Nations Conference on Trade and Development (UNCTAD) definition of DDS is an aggregation of insurance and pension services (IPS), financial services (FS), charges for the use of intellectual property (CIP) n.i.e., telecommunications, computer, and information services (TCI), other business services (OBS), and audiovisual and related services within personal, cultural, and recreational services (PCR) [94]. It is based on the concept of PICT services developed by UNCTAD [97] as well as a report of the United Nations Statistical Commission [93]. The Organisation for Economic Co-operation and Development's (OECD's) Going Digital Index includes an indicator and definition of DDS using the same categories as UNCTAD, except it does not include other business services [72]. The U.S. BEA definition of PICT services was updated in 2020 [5]. It is slightly different from UNCTAD's; however, differences are small at the global level. Most of the PCR category is included in the U.S. definition, but not in the UNCTAD or OECD definitions. The UNCTAD and U.S. BEA definitions are nearly synonymous with the category "other commercial services" (Table B1). Other commercial services include construction, which is a negligible share of trade in comparison to the other categories. DDS represent two-thirds of world services trade (Table A.1). Most categories are not business process services, however. IPS, FS, CIP, and PCR are services that can be delivered digitally, but do not refer to internal business processes typically carried out by firms and are not necessarily services created with IT devices.

[6] Services provided by U.S. FDI in other countries in PICT industries are greater than the value of U.S. PICT exports ($873 billion compared to $559 billion in 2020). Services provided by FDI to U.S. entities in PICT industries are greater than the value of imports ($479 billion compared to $328 billion) [104] [105]. This also omits services carried out in-house or supplied by domestic U.S. suppliers (business models 1 and 2).

[7] U.S. trade in OBS is primarily among affiliated entities. U.S. OBS exports were $217 billion in 2021 and affiliated share was 69% [105].

[8] Thirty-seven percent of U.S. TCI imports are unaffiliated (63% affiliated); 65% of U.S. TCI exports are to unaffiliated entities.

Table B1. Services Classification Overview and Potential Scopes for Digital Services

	BPM6/EBOPS10* standard component	Potential scope of digital services			Commercial services group	Service group	Commercial services
1	Manufacturing services on physical inputs owned by others	n/a	n/a	n/a	Goods-related	Goods-related	
2	Maintenance & repair services n.i.e.	n/a	n/a	n/a			
3	Transport	n/a	n/a	n/a	Transport	Transport	
4	Travel	n/a	n/a	n/a	Travel	Travel	
5	Construction	n/a	n/a	n/a	Other commercial services	Other services	Commercial services
6	Insurance & pension services	n/a	n/a	DDS			
7	Financial services	n/a	n/a				
8	Charges for use of IP n.i.e.	partial	partial				
9	Telecommunications, computer, & information services	IT services	IT services + business services				
10	Other business services	n/a					
11	Personal, cultural, & recreational services	n/a	n/a				
12	Government goods & services n.i.e.	n/a	n/a	n/a	n/a		n/a

Source: Author
* Extended Balance of Payments Services Classification

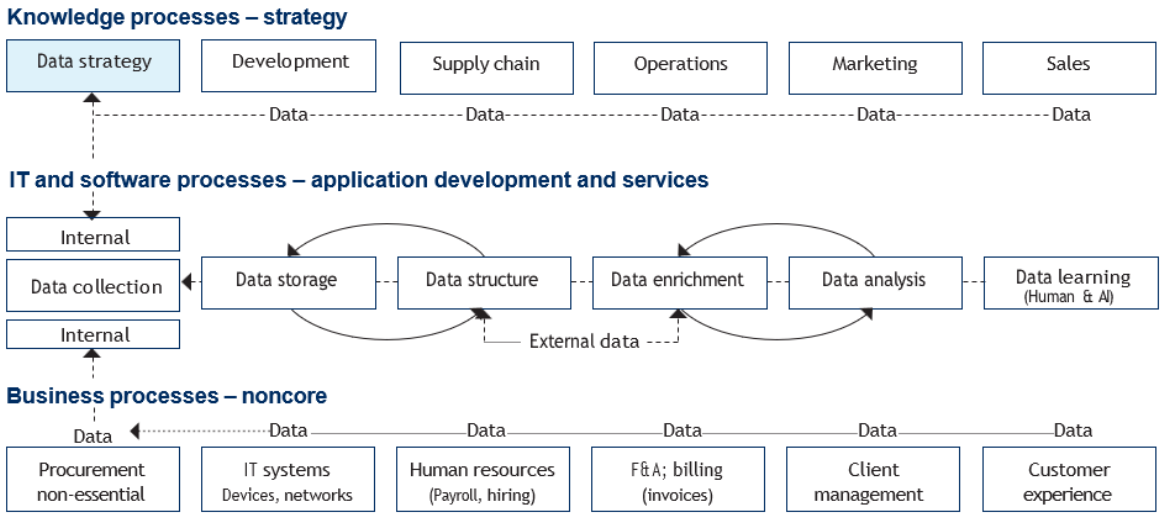
2.1. Digital Service Ecosystem

Figure 1 provides an overview of the three categories of services and data flows included in the report. KP services pertain to the core activities and strategy of a company. This includes traditional value-adding activities such as development, supplier selection and management, operations, marketing, and sales.

Given the integral role of data in business intelligence, data strategy is now a core component of a firm's strategy. Data strategy is a firm's decision on what data to collect, how to store them, and how to use them across the business.

IT and software processes are the critical elements for collecting, storing, analyzing, and learning from data. Companies must choose when to purchase or rent software products available in the market and when customized software is needed. Given the vast amount of data available, IT software and service providers play an increasingly important role in firm strategy.

Figure 1. Digital Business Process-Related Service Ecosystem



Source: Author.
Note: F&A = finance and accounting.

BPs are noncore functions a firm must do to operate. While optimizing these processes can save a company money, the activities themselves are not revenue generating. Each of these services involves data management and is carried out using application-specific software. Analyzing data related to these BPs can help a company improve efficiency and reduce costs.

The specific knowledge and BPs relevant to a company depend on the industry, position of the company along the value chain, and size. These processes and services are not new; what is new is the ability to store and analyze data about each of them. Internal analyses can also be supplemented with external data on a myriad of topics to identify correlations and optimize operations. All these data can also be used as a learning tool to build software that can provide solutions with increasingly less human intervention.

At present, existing global technology and BP service providers are adding these services to their array of offerings. Multinational enterprises (MNEs) across sectors also internalize these processes in-house. Start-ups are emerging to address new opportunities, fill gaps, and provide solutions for specific markets.

Given the increasing disparity between the size of global tech companies and MNEs with start-ups, many start-ups are funded by, and ultimately acquired by, global firms.

2.2. Business Models, Firms, and Relationships

This report considers four types of service business models. The first two focus on domestic firms, while the latter two are globally focused. The historical progression of service activities follows the order listed below, and with new technologies introduced in the last 5 to 10 years, the cycle is starting over. These will be referenced throughout the report as business models 1–4.

1. **Domestic firms carry out services for their own companies' needs internally, in-country** (in- house, in-country). No outsourcing, offshoring, or trade is involved; all activities are carried out within one company and country.

2. **Domestic service firms provide services to non-affiliated firms in the same domestic market** (outsourcing, in-country). No offshoring or trade is involved. This model is common for IT infrastructure and managed services and for knowledge-intensive BP services such as business intelligence analytics and automatable BPs. Firms developing new technologies and providing related services are primarily in high-income countries, which are also the main buyers of digital services. Domestic service firm providers may upgrade over time to export services or set up branch offices to service buyers within their regional market. The public sector (government/ education) is a significant purchaser of IT services, often from domestic rather than foreign service providers.

3. **Global MNE-owned units perform work exclusively for their parent's global operations and do not serve external clients** (in-house, offshore). MNEs establish subsidiaries in developing countries to perform noncore business activities such as customer care, finance and accounting, and payroll, among others. This enables them to maintain control of their internal operations while simultaneously reducing costs by offshoring. These are referred to as captive, global in- house centers, or SSCs. SSCs are centralized units within an organization that provide support for a range of noncore, non-revenue-generating functions [82]. Most are multicountry and multifunction (62%), or at least one or the other (78% are multicountry, 82% are multifunction) [81]. Offshoring noncore business activities in-house gained traction in the 1990s and 2000s. Trade is between affiliated entities. This business model is particularly common for business processes. Nearly half of surveyed executives indicated they handle business functions internally [25]. Core business operations (for example, sales and engineering/product development) are skewed toward internal sourcing [25].

4. **Global third-party, MNE service providers** (outsourcing, offshore) set up branch operations in large foreign markets to provide a range of IT and/or BP services to domestic and foreign- owned firms. Outsourcing noncore operations offshore expanded during the mid-2000s to early 2010s. When services are provided in-country, no trade is involved. This is like business model 2; however, the service provider is foreign owned. This is more common for IT services than business services. For example, 76% of executives in Deloitte's most recent outsourcing survey indicated their IT services were delivered via third-party models [25]. Global third-party MNE service providers also export their services to non-affiliated buyers in other countries (that is, unaffiliated trade).[11] Firms in financial services,

[11] U.S. TCI exports in 2021 were $60 billion and the unaffiliated share was 65% [105].

manufacturing, telecommunications/media, and health care are top service customers.

Partnerships and collaborations among global MNEs across tech and nontech industries are common. Digital MNEs provide the platforms for development; IT providers contribute technology, software, support, and insight; and industry-specific leaders provide domain knowledge. Third-party providers partner with specialized firms to accelerate entry into higher-value-added segments. Global MNEs frequently acquire software and service companies to enter new geographic markets, to access new clients and technologies, or to acquire scarce skilled workers [39].

The following sections describe each segment in more detail. Table A.2 includes the names of many of the largest global firms by segment, and recent market size estimates.

2.3. Digital Business Process Services

BP services are noncore activities (business functions) a company must do to operate. These relate to finance and accounting, human resources, procurement, customer relationship management, as well as call/ contact center functions, document services, and industry-specific vertical activities.[12] Business activities have traditionally been divided into voice and nonvoice. Voice-based contact centers and customer support services (customer experience outsourcing) are labor intensive and account for the bulk of BP employment. These tend to be lower-skill activities that involve a mix of phone- and text-based customer support and data entry. Language skills and time zone are important in selecting outsourcing destinations. Nonvoice activities are repetitive, yet judgment-based activities that rely on workers' ability to use IT hardware and software to input and perhaps analyze data. Large firms often carry these activities out in-house in a select number of offshore locations globally or outsource activities to third-party providers. Estimates of the size of the in-house SSC market are not available; the global BPO market is between $250 billion and $450 billion (2022).

Third-party BP providers are headquartered in high-income countries and set up branch offices in cost- competitive countries in key regions around the world to service their global clients. Approximately half of the top 50 BP providers in 2022 were headquartered in the United States/Canada, one-quarter in Europe, and the remainder in India and Japan. BP revenue from the top 50 was $106 billion [32]. The top four companies have annual BPO revenues of $7–$10 billion, with the remaining top 10 earning $3–$4 billion. Each employ 60,000–400,00 workers globally.

2.3.1. Workforce

Workers must know how to use IT hardware and software including a computer, software programs, and other electronic hardware devices (phones, printers, faxes), but they do not

[12] IT system services related to maintaining a company's hardware (network systems and electronic devices) and software within a facility, across locations, and with relevant suppliers and customers, along with application (software) development are BP services, but these activities are considered their own segment given differences in skills, firms, and market size.

need programming skills. Back-office services were offshored in the early 2000s to locations with lower wages including LAC countries. Many of these activities are now automatable and require fewer workers, thus reducing the need for offshoring. Robotic process automation and intelligent process automation are key technological areas. Robotic process automation takes repetitive manual tasks and uses software robots that use automation technology to complete back- office tasks that were previously left to human workers. Some of these tasks include filling out forms, extracting data, or transferring files [82] [22]. Intelligent process automation goes a step further by adding advanced cognitive technologies such as AI to expand BP automation across the entire enterprise.

Employment in occupations in Table 1 are all projected to decline in the United States over the next decade. These jobs will likely be offshored or replaced with automated technologies. Top industries employing BP-related workers include professional services, finance and insurance, administration and support services, and health care and social assistance. BP occupations generally require an upper- secondary (high school) education and job-specific training.

The International Telecommunication Union (ITU) divides digital skills into three categories: basic, intermediate, and advanced [28]. BP workers generally require intermediate digital skills. IT services require advanced digital skills Basic digital skills are important to increase domestic demand for digital services.

Table 1. Business Process Outsourcing Occupations

Occupation	Job description	U.S. employment (2021)
Customer service representative	Answers calls regarding specific products and provides general customer services	2,898,900
Data entry keyer/ operator	Enters data into computer databases, manages and maintains effective recordkeeping	155,900
Bookkeeping, accounting, auditing clerk	Provides accounts receivable and payable processing, reconciliations, ledger keeping, and income and cash statement monitoring	1,707,800
Payroll and human resources clerks	Gather and process employee information on hours, wages, benefits, bonus, taxes, etc.	157,700
Billing and posting clerks	Compile and record numerical data for billing purposes; prepare invoices	445,300

Source: [68]

2.3.2. Trade Analysis

The world OBS export value is far greater and broader than what is considered BPO in market reports ($1.6 trillion in 2021 compared to approximately $300 billion). OBS n.i.e. within technical, trade-related, and other business services (TTOBS) covers any OBS

that cannot be classified as business services listed elsewhere [100]. Given that there is not an EBOPS10 category that aligns with BPO services, it is likely a catch-all for BPO activities, particularly contact centers.[13] World exports of OBS n.i.e were $283 billion in 2021.[14] BP services are likely also within two professional and management consulting (PMC) subcategories—accounting, auditing, bookkeeping, and tax consulting services (L4) and advertising, market research, and public opinion polling (L3). World exports of these subcategories were approximately $50 billion and $175 billion (2021), respectively.

Table 2 presents top global OBS exporters based on balanced values. The main segment column includes the country's dominant export subcategory. The United States has been the top exporter since 2005 and accounted for 17% of world exports in 2021. Both U.S. imports and exports of OBS are primarily with affiliated entities.[15] European countries' share of global OBS exports is decreasing (except Ireland) while China, Singapore, and India's share increased to 13% of world exports in 2021. Singapore's top export partner is Japan (19% of exports) and increasing; India exports to the United States (22%) and the United Kingdom (12%); China exports to Hong Kong and the United States (15% each). Other Asian countries that primarily export within TTOBS rather than PMC include the Philippines, Thailand, Malaysia, Indonesia, and Vietnam. Each country accounts for 1% or less of world exports, with export values of $3–$12 billion. LAC countries collectively accounted for 2% of exports in 2021.

The top 10 importers accounted for 62% of OBS balanced imports in 2021. The United States is the top importer (12%); Japan, China, and Singapore also collectively account for 12% of world imports. Within Europe, imports from Ireland, the United Kingdom, and the Netherlands increased the most between 2015 and 2021. LAC accounted for 3% of imports in 2021 [73].

Table 2. Top 10 OBS Balanced Exporters, 2015–21

Exporting Country/ Region	Export value (billion $)		World share (%)	Change (%)	Main segment
	2015	2021	2021	2015–21	
World	1,099	1,620		47	
United States	190	281	17	48	PMC
United Kingdom	115	162	10	42	PMC/TTOBS
Germany	84	107	7	27	TTOBS/PMC
Ireland	33	82	5	151	TTOBS
France	67	81	5	21	TTOBS
China	51	81	5	59	Not available beyond L2
Singapore	36	73	4	101	TTOBS

[13] The Philippines is a top offshore location for contact centers, and most of the country's exports are in TTOBS (rather than PMC).

[14] OBS n.i.e. accounted for the largest share of TTOBS exports in 2020 (41%).

[15] Affiliated entities accounted for 69% of OBS U.S. trade for both trade flows in 2021.

Netherlands	52	66	4	27	TTOBS/PMC
India	34	64	4	89	PMC
Belgium	34	44	3	30	PMC
Top 5, 2021	488	713	44	46	
LAC (41 countries)	33	38	2	16	
China, Singapore, India	121	218	13	80	
Poland	9	20	1	112	PMC
Philippines	9	12	1	42	TTOBS
Thailand	5	8	0.5	72	TTOBS
Malaysia	5	7	0.4	37	TTOBS/PMC
Indonesia	3	5	0.3	35	TTOBS
Vietnam	1	3	0.2	161	TTOBS

Source: [73].
Note: Top OBS n.i.e. exporters (based on available reported data) are the United Kingdom, France, Ireland, the United States, South

2.4. It Services and Software

IT services encompass software and applications development, data centers/storage (infrastructure), IT system network management and security, and consulting. Internet access has enabled software to be purchased, delivered, and updated without the need for physical media or distribution. The Software-as-a-Service (SaaS) business model has increased significantly since 2016. Global market estimates increased from $10 billion to $221 billion between 2016 and 2022 [53] [58]. Estimates of the global software market in 2022 are between $650 billion and $1 trillion [60].

Software is used to manage BPs and data related to people (workers), companies (buyers/suppliers), products, and processes. These correlate to BPs including enterprise resource planning/management, customer relationship management, human resources, financial management, and data management and analytics (business intelligence). Companies benefit from software that interfaces with other programs. For example, it is advantageous for a company to have a program that can analyze and store data on suppliers and distribution/inventory, customers and sales, and real-time information on purchases. This creates demand for occupations in systems integration, and creates a market for customized application development and global partnerships among global software firms.

Operating systems and BP software are dominated by a few global firms that account for a significant share of the global market. These digital leaders provide the fundamental software and platform infrastructure services used globally. Industry-relevant revenue of 12 companies (Microsoft, AWS, Google, IBM, Oracle, SAP, Salesforce, Adobe, VMWare, HPE, Alibaba, and Huawei) totaled nearly $500 billion in 2022, with each firm employing 30,000–300,000 workers globally. Microsoft accounts for a sizable share of systems software, along with Oracle and IBM. Salesforce, SAP, and Adobe are significant application software providers.

The rest of the application software market is fragmented and diverse in terms of functions and firms. The global market for business intelligence and data analytics software approached $100 billion in 2022. Analytics software firms are much smaller;

even the largest firms' revenues are below $4 billion with less than 7,000 workers. Most are U.S. based and were established in the 2000s. These companies have partnerships with the major digital technology companies and with analytics and consulting companies that use their software and tools to assist customers in their respective geographies or industries. The software and data industry accounted for 32% of the world's start-ups in 2022 and 2023 [85]. It is also the industry with the highest share of privately held start-up companies, with a value of over $1 billion (39%).

Digital services are possible due to physical IT hardware and infrastructure products.[16] This report does not cover production of hardware or infrastructure goods, but does include IT infrastructure services. Infrastructure as a Service (IaaS) is dominated by three companies (Microsoft, Amazon, Google), also referred to as cloud service providers (CSPs) or hyperscalers. The service is renting space on a server to store data and/or platforms on servers owned by the CSPs. In colocation data centers, the service is renting the physical space and servers. Data can also be stored in-house on servers owned by the company. The global market value of IaaS was nearly $70 billion, and the colocation data center market was over $50 billion.

IT maintenance and security services such as setting up access to networks, systems, and infrastructure and providing user support are relevant regardless of where data are stored. These activities were initially part of internal IT service departments but are now often outsourced to third-party firms that provide IT- managed services for servers, data centers, and related software across global locations. These companies are referred to as managed service providers or third-party IT service providers. Data center providers and CSPs may provide IT services in-house, outsource to managed service providers on behalf of their clients, or partner with managed service providers to offer bundled packages. Boundaries are difficult to parse. The global managed services market is between $260 billion and $500 billion (2022) [66] [59]. The increase in remote and hybrid work environments is increasing demand for these services.

IT consulting is relevant to any organization that wants to evaluate its infrastructure and software (systems integration) strategy. Hardware and software consultancy and implementation services are considered part of computer services rather than business consulting [100]. Customized application development and management are closely related because companies that provide IT consulting also provide development services. The Platform as a Service (PaaS) market is related to application development services. Global market estimates of the IT consulting and application development market were around $235 billion in 2022. **The global market for IT-managed services, application development, and consulting was between $500 billion and $700 billion in 2022.**

Eight of the top 20 global third-party IT service firms are from India (40%). Six are European based (30%), five are U.S. based (25%), and one is Japanese (based on 2023 data). Over three-quarters of Indian firms' employment is in India; for non-Indian firms, the share is generally between 40% and 50%. Large IT service companies also provide

[16] IT hardware includes the physical electronic devices that are used to create and store data (such as a computer or smartphone and servers) and transmit data (cables) and may also cover the physical building housing a data center.

some BP services.[17] The top 10 IT firms are much larger than BPO providers, with annual IT revenues between $10 billion and $60 billion and 100,000–600,000 workers. Providers with LAC locations primarily serve domestic and foreign firms in the national market.

2.4.1. Workforce

Each segment requires different skill sets. Software and applications developers use computers to create digital content using a range of platforms and scripting languages. Programmers create and maintain (software) applications for computers, mobile phones, video games, and other embedded applications. Most have undergraduate or advanced degrees in computer science and are often trained in several programming languages (JavaScript, Oracle Java, SQL, and Python). For websites and mobile application, workers with tech-specific design and marketing skills are important as well. For example, user experience workers test and analyze how users feel about a system, looking at ease of use and how a user navigates through a website.

Network specialists focus on hardware and software integration and security. Network engineers and technicians are responsible for designing, implementing, and maintaining computer networks, to ensure that clients have reliable connectivity. Problem-solving skills are essential for diagnosing and resolving issues. System administrators manage and maintain servers, including operating system updates, security patches, and system backups, to keep IT systems running smoothly. Security specialists focus on safeguarding the provider's infrastructure and clients' networks and data by implementing security measures, monitoring for threats and vulnerabilities, and responding to security incidents. Cloud engineers specialize in designing, implementing, and managing cloud-based solutions, such as AWS, Azure, or Google Cloud. IT project managers oversee projects, ensuring they are delivered on time and within budget, while meeting clients' specific requirements. Compliance specialists ensure sensitive information is safeguarded and ensures the provider adheres to industry regulations and standards, especially in sectors with strict requirements like health care. Support technicians provide technical assistance to clients and need to understand how the technology operates and be able to communicate with users and clients.

Software and IT service–related workers typically have a university degree. However, software, CSPs, and third-party organizations offer certifications to individuals to demonstrate proficiency in using programs developed by the company. This provides a revenue stream for the company, helps fill workforce gaps by enabling individuals to learn skills faster and at a lower cost than an advanced degree, and is a way to increase market share by increasing the number of workers proficient in using their software. Examples include Microsoft, Oracle, SAP, Salesforce, IBM, Cisco, Apple, and Google [39].

2.4.2. Trade Analysis

TCI services are the best available proxy for evaluating trade in IT services and software. Within TCI, computer services are the main subsegment and consist of hardware- and software-related services and data processing services [100].

Trade is driven by developed countries, with the exception of India. World TCI services balanced exports were $681 billion in 2021 [73]. The top exporters are Ireland (18%), the United States (11%), India (8%), the United Kingdom (6%), and Germany (5%).

[17] BPO services revenue included in IT services revenue was around $21 billion in 2021.

These top five have been the same between 2011 and 2021; however, Ireland overtook the United States as the top exporter after 2015. Some of the larger European firms include Accenture (Ireland), and SAP (Germany), as well as Capgemini and Atos from France.

India, Singapore, and China accounted for 15% of TCI balanced exports in 2021. India's top TCI export destination is the United States (23%, 2021), but the value has decreased since 2015. Export growth to Singapore and Germany from India has been notable. India is home to several global IT services firms including TCS, Infosys, and Wipro.

China's top TCI export destinations are Hong Kong (20%), the United States (14%), Japan (8%), and Singapore (7%). Huawei and Alibaba are notable Chinese technology-related firms. China's position as a TCI exporter is questionable, however, given significant discrepancies in reported U.S. data.[18] Singapore exports to Japan (21%), Australia (10%), and China (8%). Seven of Singapore's top 10 destinations are in the Asia-Pacific region [73]. Singapore is an emerging exporter that generally services other Asia-Pacific countries. Its focus has been on attracting regional headquarters and innovation centers of global MNEs.

The top 10 TCI balanced importers accounted for 54% of world imports in 2021; the United States was the top importer (12%). Japan, China, and Singapore collectively accounted for 12% of TCI imports.

Within Europe, imports are increasing the most in Germany and Ireland, while import value is decreasing in the Netherlands. LAC's share of world TCI imports was 3% in 2021 [73].

Table 3. Top 10 TCI Balanced Exporters, 2015–21

Exporting Country/Region	Export value (billion $)		Share (%)	Change (%)	Rank
	2015	2021	2021	2015–21	2021
World	410	681		66	
Ireland	41	122	18	199	1
United States	46	74	11	62	2
India	36	53	8	48	3
United Kingdom	33	44	6	35	4
Germany	28	37	5	34	5
Netherlands	24	31	5	28	6
China	14	30	4	104	7
France	16	20	3	27	8
Singapore	9	19	3	109	9

[18] Balanced TCI exports from China to the United States were $4.2 billion (2021). The United States only reported $537 million in TCI imports from China (1% of the U.S. total). To the extent China exports to the United States, it is likely among affiliated entities.

Sweden	13	16	2	24	10
Top 5, 2021	183	331	49	81	
Top 10, 2021	259	446	66	72	
LAC (41 countries)	8	12	2	48	
India, China, Singapore	59	101	15	71	

Source: [73].

Note: Computer service export values are significantly overreported according to BaTIS. In 2021, reported world exports of computer services were $750 billion compared to the balanced value of $681 billion. The three top exporters (Ireland, India, China) are all overreporters. However, the top 10 exporters are still the same, except Israel (which overreports) is in the list of top computer service exporters and Sweden is in the top 10 for balanced TCI.

2.5. Knowledge Process Services

KP services are related to the core activities of a company such as strategy development and marketing, which require more specialized expertise. These services may include research and data analysis (competitive analysis, risk management, business development, financial research, and legal processes) with a focus on delivering high-value insights and solutions to support business decision-making and operations.

Analytics services rely on having relevant data, data storage platforms, and software to provide useful insights across business functions. This is often referred to as business intelligence or business and data analytics. Data are analyzed to understand and describe past and present trends (descriptive analytics), to understand why something happened (diagnostic), to make future decisions (predictive), and to suggest the best steps forward based on informed simulations of what has happened and could happen [63].

Data for consumer and industrial markets come from different sources. Consumer data come from use of DDS such as digital financial transactions or social media. Industrial data come from monitoring processes, output, and logistics of products and services along the supply chain. The general population must have basic digital skills and use electronic devices to generate relevant data. Industrial data collection requires firms to use sensors and software that collects information. Consumer data are subject to personal data laws, whereas industrial data are bound by firms' policies on data sharing.

Other terms to describe this segment include advanced analytics services, analytics as a service, big data services, cloud professional services, and enterprise data management services [64] [63] [14]. The global KP service outsourcing market is perhaps $25–$50 billion (2022). Analytics services trade may be considered business and management consulting, advertising, or market research depending on how the data are used.

Data analysis has become increasingly synonymous with AI and machine learning. Analyzing data still requires human intervention and interpretation; however, data are also used to develop AI. AI generally refers to computer software that "learns" from data, behaves intelligently and mimics human cognition and perception. AI covers a wide range of models and processes, including deep learning, machine learning, and natural language processing, that depend on the use of large amounts of data to train software in patterns and create corresponding outcomes [29].

Platform software products are readily available from global tech MNEs for some applications; however, firms often seek out third-party providers to develop customized applications. Given the extensive use of technology in BP services, the line between IT and BP is difficult to draw. For example, a large MNE may work with an IT service provider to develop a custom application to store and share an organization's data across departments. This may also include embedding a system that runs regular analytics reports on the data. As such, the system is running the data and producing reports for the company to use to make business decisions. Similarly, the third-party provider may provide these services from its home country or from an offshore location in the home market of the client company or in a foreign location in which both firms operate.

The data analytics services industry is fragmented, and the average firm is much smaller than in IT or BP services. The largest firms have revenues under $1 billion and less than 10,000 workers. Global third-party IT/BP companies provide these services, as do many smaller, local companies. Large firms purchase software (or services) to store and analyze data, but conduct analyses in-house or use a hybrid model by working with large third-party providers to develop some custom applications. Smaller, localized service providers form partnerships with software and cloud computing companies to reach a larger audience.

Analytics start-ups often specialize in a select number of industries. Start-ups receive funding or accelerator assistance from global tech and industry-specific MNEs; ultimately many are acquired by them. For example, as of June 2023, 10 of the 25 analytics start-ups from multiple industrial sectors identified by Frederick, Bamber, and Cho [39] had been acquired: 9 are in Series A-E funding, 2 are supported by incubators/accelerators, 2 have debt, 1 issued an initial public offering, and 1 failed.

2.5.1. Workforce

Analysts use technology and tacit knowledge to identify and understand key factors with an impact on business outcomes. Table 4 includes data and analytics occupations based on U.S. data. All tend to require a university degree or higher along with math, statistics, business, and computer software skills. Opportunities are often industry specific, so domain expertise is beneficial. Employment across all occupations in Table 4 is projected to increase at rates above the U.S. national average over the next decade.

Table 4. Data and Analytics Occupations

Occupation	Typical education	Description	U.S. employment (2021)
Data scientist/ business intelligence analyst[1]	Bachelor's: 76% Master's: 14%	Provide market research, opportunity assessment, strategy development, and business optimization services; retrieve and interpret data to customer needs	113,300
Statistician	Bachelor's: 15% Master's: 65% Ph.D.: 20%	Apply mathematical or statistical theory and methods to interpret and summarize numerical data as useful information	34,200

Operations research analyst	Bachelor's: 30% Master's: 70%	Form and apply mathematical modeling and other optimizing methods to develop and interpret information that assists management with decision-making	104,200
Market research analyst	Bachelor's: 71% Master's: 21%	Research market conditions in local, regional, or national areas; gather information on competitors, prices, sales, and distribution to identify potential sales/marketing strategies	792,500
Management analyst; consultant	Bachelor's: 57% Master's: 24%	Conduct organizational studies and evaluations, design systems and procedures, and assist management in operating more efficiently and effectively	950,600
Database administrator	Bachelor's: 77%	Administer, test, and implement computer databases, applying knowledge of database management systems	91,800
Database architect	Bachelor's; 58% Master's: 29%	Model, design, and construct large relational databases or warehouses; create and optimize data models; integrate new systems with existing structure	52,700

Source: Author based on data from O*NET [68]. The top industry for all analytics occupations is professional, scientific, and technical services, which generally accounts for about a third of occupations.
Note: (1) Business intelligence analysts are considered a subset of data scientists. U.S. employment data represent all data scientists.

Data scientists develop and implement techniques to transform raw data into meaningful information using data-oriented programming languages (Python, R, SQL) and visualization software (Tableau, Microsoft BI). They apply data mining, modeling, natural language processing, and machine learning to extract information from large datasets. Different types of analysts use this information to make recommendations and report findings, often using Microsoft Office Suite products. On the tech side, data must be in a structured format to be analyzed. Database administrators and architects require similar programming skills as data scientists.

3. Lac's Participation in Digital Services and Potential Opportunities

This section focuses on LAC countries with the most potential and participation in digital business process services: Brazil, Mexico, Colombia, Chile, Argentina, Uruguay, Costa Rica, and Peru. It does not include analysis of digital services by domestic firms for the domestic market. Table A.3 includes data and sources used in this section.

3.1. Firms And Employment

Latin America is among the smallest regional markets globally for digital services across segments.[19] In 2022, Latin America accounted for 6% of the global big data market and managed services market [67] [66],[20] and 5% each of the software, BPO, and IT services

[19] The Latin American market is larger than estimates for Africa, and generally similar in size when the Middle East and Africa are listed as a combined market.

[20] Africa accounted for 4% of the global market.

markets (2022) [61] [57]. LAC shares of digital service markets are slightly below its share of global GDP (7%).

Activities within LAC are largely carried out by foreign-owned firms from the United States, Europe, and India with limited participation of LAC-based firms. For example, U.S. foreign affiliates provided $46 billion in the information services and professional, scientific, and technical services industries in 2020 in South and Central America [108].[21] Over 90% of these services were to unaffiliated entities in the host economy of the foreign affiliate [104].[22] Most U.S. activity is in Brazil and Mexico, which accounted for 48% and 22%, respectively. LAC also has the lowest number of data centers among global regions [21]. This suggests not much data are being collected, and/or data are stored in-house/on premises. There were around 560 data centers in LAC as of May 2023 [21]. To put this in perspective, there were over 5,300 in the United States alone. There is a significant drop in the number per country after Mexico and Brazil, which together account for 57% of LAC centers. Top operators include Equinix, Digital Realty, and Cirion Technologies. There are a few regional providers including Ascenty, a Brazil unicorn established in 2010 with 34 data centers in Brazil, Mexico, Chile, and Colombia; and KIO Networks, originally a Mexican unicorn established in 2002,[23] with 20 data centers primarily in Mexico, and one each in the Dominican Republic, Panama, and Guatemala. Global hyperscalers have a small but growing presence in the region. Microsoft has data centers in Brazil and plans for Chile and Mexico; Google is in Brazil and Chile; Huawei has data centers in Chile, Brazil, Mexico, and Peru; and AWS is in Brazil and Chile. Chile is an increasingly population destination, followed by Colombia.

3.1.1. Employment

Several methods were used to generate employment estimates. These include industry associations and market reports, national labor force statistics, and firm-level estimates generated by identifying employment of IT and BP firms in the region.

Industry associations provide reasonable estimates in Brazil, Costa Rica, and Uruguay. Brazil likely has around 1 million workers (IT and BP, excluding in-house), Uruguay has 77,000 (IT and BP), and Costa Rica has 65,000 (IT and BP). Colombia may also have nearly 1 million (two-thirds BP; one-third IT), and Mexico around 844,000 (estimated 644,000 in IT and 200,000 in BP). Argentina employs 130,000 in IT, Chile has 113,000 IT professionals and technicians, and Peru has 50,000 in the BPO industry and perhaps 30,000 in computer programming, consultancy, and related activities (Table A.3). The Everest Group suggests the combined IT and BP service industries employed 912,000 in Latin America in 2020 [34]; however, this only includes global service exporters from SSCs and third-party MNE providers.

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[21] Argentina, Brazil, and Chile (information services); Peru and Mexico (professional, scientific, and technical services).

[22] Data are not available at the industry level by affiliation. However, for all services to South and Central America ($111 billion) by U.S. foreign affiliates, 93% was to unaffiliated persons/entities (2020), and 93% was also provided to entities within the host economy where the foreign affiliate is located.

[23] Acquired by 1 Squared Capital in 2021.

The companies mentioned below collectively employ around 519,000 workers in LAC. Of this total, 340,000 workers are in BPO. This does not include captive SSC employment, software MNEs, or hyperscalers. Comprehensive employment data are not available for SSCs, but Argentina, Costa Rica, and Colombia are common locations in LAC for global business/broad spectrum services units; and more of Uruguay's employment is from captive than third-party providers [102].

Large domestic IT firms with domestic and regional operations (business model 2) include Softek (Mexico, 15,000), Globant (Argentina, 16,000), Mercado Libre (Argentina, 16,000), Totvs (Brazil, over 10,000), Stefanini (Brazil), and Sonda (Chile, 14,000). These companies employ around **70,000 workers** (not including Stefanini).

Regarding global third-party service providers (business model 4), IT service providers are largely in Brazil, Mexico, and—to a lesser extent—Costa Rica. BP service providers are in Colombia and Costa Rica, as well as other Central American and Caribbean countries. Chile and Uruguay are not top locations for global third-party service providers.

Indian third-party service providers in the LAC region employ at least **43,000 workers**. Essentially, all have locations in Mexico, Brazil, and Costa Rica. TCS has an estimated 25,000 workers [19]. Locations in Latin America are for local customers (mostly banks), except some activities in Mexico, Uruguay, and Guatemala [18]. HCL, Infosys, and Wipro each employ 5,500 to 6,000 in the region. Tech Mahindra is in Brazil and Mexico, and Mphasis is in Mexico and Costa Rica. European and U.S. third-party IT- BP providers employ at least **69,000** in LAC, based on data from Capgemini, NTT Data, DXC, Atos, Accenture, and Cognizant.[24] Mexico, Brazil, Argentina, and Costa Rica are top locations.

Between 2015 and 2022, approximately 180,000 contact center jobs were announced in the Latin American region [80] [79]. BPO contact centers employ at least **280,000 in LAC.** Colombia is the primary location. Teleperformance employs over 120,000 in the region [88], with over one-third in Colombia, followed by Brazil and Mexico. Atento employs over 100,000 in LAC. Foundever (formerly Sykes/Sitel) employs 31,700 in LAC across eight countries, with most in Colombia, Costa Rica, Brazil, Mexico, and El Salvador. Concentrix has at least 10,000 workers in the region. Telus employs 16,500 in El Salvador, Guatemala, and Costa Rica. Alorica has over 11,000 in LAC with locations in Jamaica, Guatemala, Mexico, Colombia, Uruguay, Honduras, and the Dominican Republic. TTEC employs 4,900 in Brazil, Colombia, Mexico, Costa Rica, and Honduras. Sutherland has locations in Colombia, Jamaica, and Mexico.

Third-party BPO providers other than contact centers employ at least **60,000 workers** in LAC. Konecta employs 40,000; Conduent has an estimated 10,000 workers in Jamaica, Guatemala, and Mexico. Genpact and Alight Solutions have smaller operations in the region.

3.1.2. Trade

LAC balanced OBS/TCI exports were $51 billion in 2021 and accounted for 2% of world exports in 2021. Figure 2 charts the evolution of LAC's top exporters, which were Brazil (26% of LAC exports), Mexico (19%), Argentina (8%), Costa Rica (8%), Colombia (5%), Chile (5%), Panama (4%), Uruguay (4%), and Peru (3%) [74].

[24] Capgemini has 11,500; NTT Data employs 18,300; Atos employs around 4,000; Accenture likely employs over 30,000 in LAC; and Cognizant had 3,000 employees in 2017.

TTOBS is the main export category for Brazil and Colombia. PMC is the top category for Costa Rica and Peru [94]. Computer services are the top reported export category for Uruguay and Argentina [94].

LAC countries reported and balanced import and export values are similar for Colombia, Peru, Argentina, and Uruguay. Brazil and Costa Rica overreport exports primarily in OBS, and Brazil's import values by category differ. Chile underreports in TCI. Reported and balanced values are quite different for Mexico by total value and category. Balanced data suggest Mexico's exports are underreported and misclassified as primarily insurance and pension services rather than OBS.

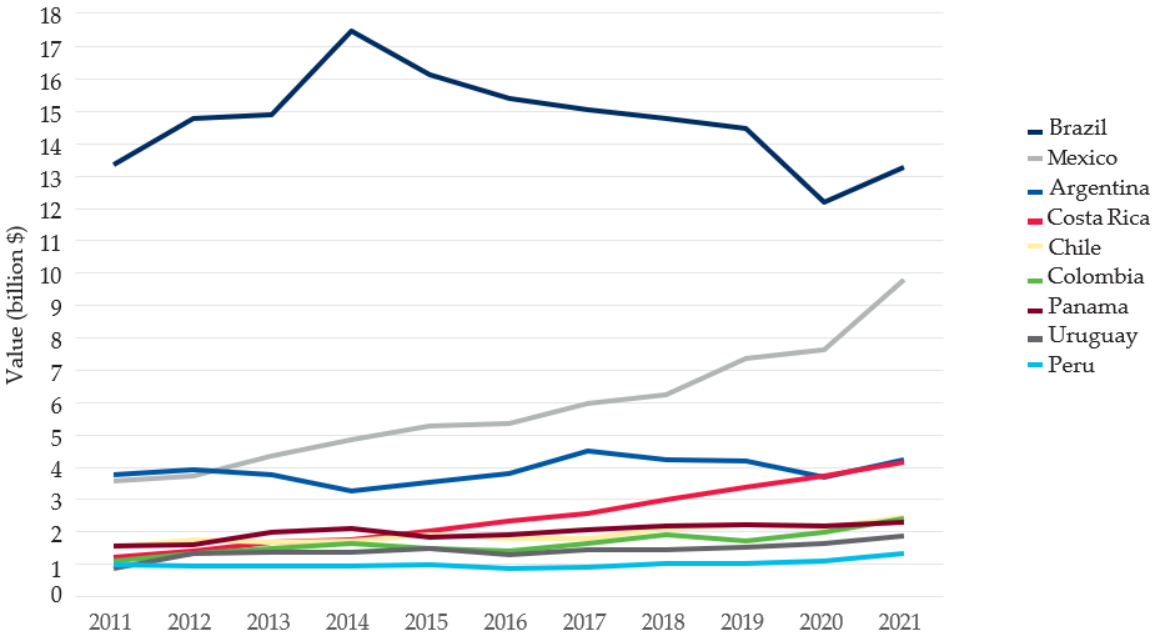
The United States is LAC's top OBS/TCI balanced export destination (32% of LAC's exports), followed by European countries (United Kingdom, Netherlands, Switzerland, Germany) [74]. LAC's top 10 OBS and TCI export destinations are the same, except Canada and Spain are among the top 10 for TCI and France and Ireland for OBS.

TCI exports are increasing to Europe and Asia (China, Singapore, Japan, India, Korea), while exports to the United States and Canada had a similar value in 2015 and 2021, and the share of LAC's exports fell from 44% to 30% of exports (Figure 3). LAC accounted for 11–12% in both years.

The United States is the main export destination for LAC's OBS exports (Figure 4).[25] The United States and Canada and main European destinations collectively accounted for similar shares of LAC's OBS exports in 2015 and 2021 (33–35% each). Export values to LAC and LAC's share of LAC's OBS exports have declined, as have exports to Russia and Saudi Arabia. LAC's top 10 export destinations in 2021 accounted for 69% of the region's OBS exports [73]. As with TCI exports, Asia-Pacific is increasingly important.

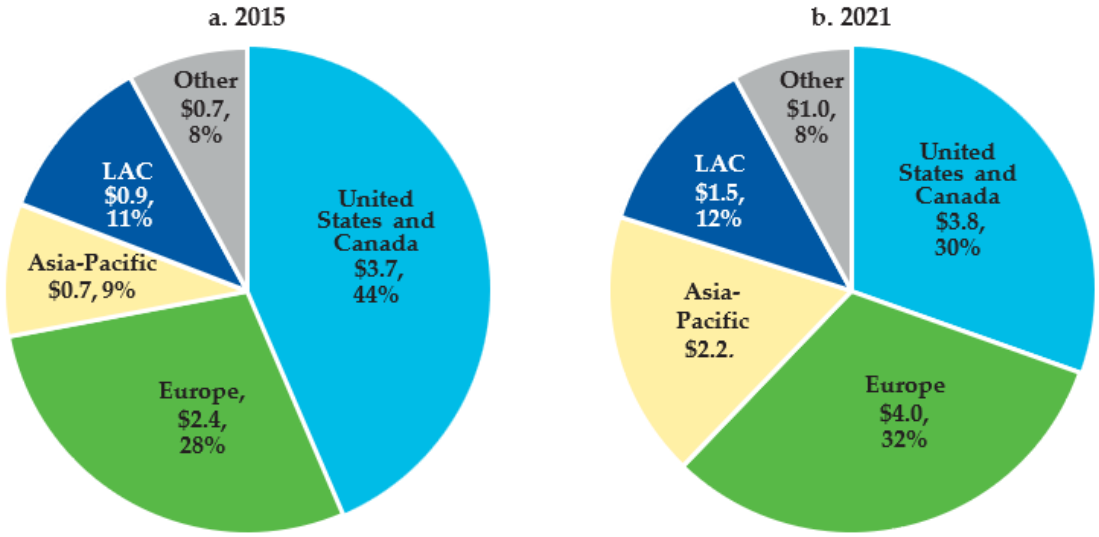
Figure 2. Top LAC OBS/TCI Balanced Export Values, 2011 to 2021

[25] U.S. imports from LAC are from Mexico (39%), Brazil (14%), and Costa Rica (12%) [105].



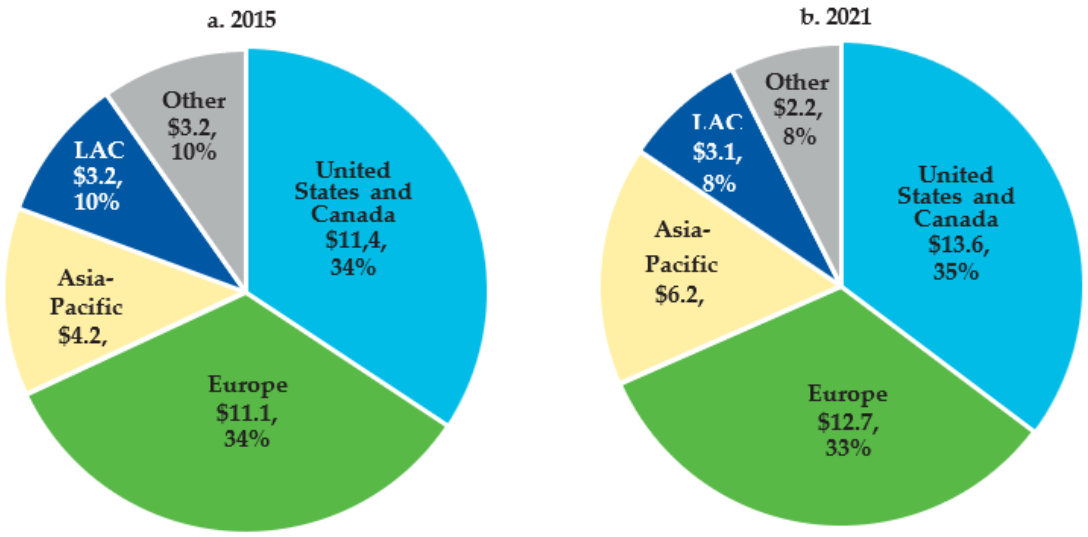
Source: [74].

Figure 3. LAC TCI Balanced Export Destinations, 2015 and 2021 (billion $)



Data source: [73].
Note: Asia-Pacific comprises China, Singapore, Japan, India, Korea, Hong Kong, Taiwan, Australia, Indonesia, Thailand, the Philippines, Vietnam, Macau, Bangladesh, and Malaysia. Europe comprises Germany, Switzerland, the Netherlands, the United Kingdom, Spain, Ireland, France, Sweden, Italy, Norway, Belgium, Luxembourg, Denmark, Cyprus, Portugal, Finland, and Poland. LAC represents 41 countries.

Figure 4. LAC OBS Balanced Export Destinations, 2015 and 2021 (billion $)



Data source: [73].
Note: Asia Pacific, Europe, and LAC comprise the same countries as in Figure 3. Top "Other" reporters include Russia, Saudi Arabia, United Arab Emirates, and Qatar.

3.1.3. Imports

LAC's balanced OBS/TCI imports were $68 billion in 2021 [73]. The United States is the primary provider, followed by European countries (Ireland, the United Kingdom, the Netherlands, Germany, France, Spain), and Asian countries (India, China, Japan, Singapore). Imports from the United States and Asia are increasing, while imports from Europe are decreasing.

The United States accounts for 36–40% of OBS/TCI imports for all countries except Uruguay (29%). Ireland is a top three OBS/TCI import source for Mexico, Argentina, Costa Rica, and Chile (Accenture has locations in all these countries). India is a top three import source, and values are increasing for Brazil, Colombia, and Peru.

LAC imports of TCI were $23 billion in 2021. Based on value, top importers of TCI services are Brazil, Mexico, Chile, Argentina, and Colombia. TCI imports are increasing across LAC countries, except Brazil [73]. The United States is the main source of imports (36%) followed by India (9%) and Ireland (7%). TCI import values have increased from the United States[26] and top European countries, but both are becoming less important to LAC. Asia (India, China) accounted for 13% of LAC's TCI imports (2021). TCI imports from other LAC countries have increased since 2015. In 2021, $1.5 billion came from LAC countries (7% of LAC imports).

[26] U.S. computer services exports go to Mexico and Brazil, with smaller shares to other countries. Most is computer software, including end-user licenses and customization.

OBS import values essentially remained the same between 2015 and 2021, which suggests LAC demand has been stagnant. Imports from top European countries have decreased since 2015; imports from the United States[27] and Asian countries (India, China, Japan) have increased. Imports from LAC countries have accounted for 5% of imports since 2005 and were the same in 2015 and 2021 ($3.2 billion). Based on value, top importers are Mexico, Brazil, Argentina, and Colombia. Argentina's and Colombia's import values decreased between 2015 and 2021; both are importing less from Brazil.

European and Asian countries appear to provide more public support for developing digital service capabilities in Latin America than the United States [11] [8]. All main LAC countries have at least one digital collaborative project with the European Union (EU) (Table A.3). Development support and engagement with the United States may exist, but was not evident in the literature reviewed. While the United States is still the primary export destination and import source for the LAC region, its relative importance in terms of market share has declined or remained the same over the last six years.

3.2. LAC Country Groups

Costa Rica, Mexico, and Colombia have a strong U .S., foreign investment–driven focus. In each country, the United States accounts for over 40% of OBS/TCI exports, and the value has increased since 2015. These countries also have sizable export and foreign investment promotion efforts. Each country plays a different role. Costa Rica provides a range of export-oriented services (BP, IT, and KP) via U.S. captive SSCs (business model 3) and third-party MNE providers (business model 4). Costa Rica's exports are primarily OBS rather than TCI. Colombia hosts European and U.S. third-party BPO providers (business model 4) that provide contact center and other BPs to U.S., European, and regional clients.

Colombia's OBS/TCI balanced export value in 2021 was $2.4 billion.[28] Colombia has significant BPO employment, but comparatively low BP exports, because the value associated with contact center activities tends to be low. Colombia's TCI imports are significant, while OBS imports are declining due to a reduction in TTOBS.

Mexico hosts a mix of third-party IT service providers that support domestic and foreign investors in Mexico (business model 4) and U.S. captive BP service centers that support affiliated U.S. offices (business model 3). Top U.S. imports from Mexico within OBS are OBS n.i.e (38%, $1.6 billion) and PMC (24%, $1 billion).[29] TCI imports were $0.7 billion [105].

Argentina and Uruguay are the most regionally oriented traders, followed by Colombia and Costa Rica. Argentina is the most regionally oriented exporter; 24% of Argentina's OBS/TCI balanced exports in 2021 were to other LAC countries; compared to 20% of Uruguay's and 13% of both Colombia's and Costa Rica's exports. Export values to LAC have increased in all these countries since 2015. Uruguay

[27] Mexico, Brazil, and Chile are the top destinations of U.S. OBS exports. Business and management consulting is the main subcategory to Brazil; Mexico is business management consulting and TTOBS; Chile is PMCs [105].

[28] Based on 2019 data, 62% of OBS exports is from OBS n.i.e.

[29] Total OBS U.S. reported imports from Mexico were $4.3 billion in 2021.

has the largest share of OBS/TCI imports from LAC (17% in 2021); next are Colombia (13%), and Argentina (11%). Uruguay is also among the least focused on the United States, which only accounted for 19% of OBS/TCI exports in 2021. Argentina's main exports are computer services and PMC services. Uruguay's main export is also computer services, while OBS exports have declined since 2015. Argentinian firms account for a significant portion of employment.

Brazil, Mexico, and Chile are generally less engaged in trade with other LAC countries. LAC countries only accounted for 3% of Mexico's OBS/TCI exports in 2021, 7% of Brazil's, and 10% of Chile's. Values are increasing in Mexico, whereas they have decreased since 2015 for the latter two. OBS/TCI imports from other LAC countries accounted for 7% of Chile's imports, 5% of Mexico's, and 4% of Brazil's.

Brazil is the most significant LAC exporter, but exports are decreasing. Brazil's OBS imports and exports have declined since 2014—specifically in TTOBS, which is Brazil's main export and import. Brazil's regional exports are declining, particularly to the Cayman Islands, the Bahamas, Argentina, Colombia, and Chile.[30] Exports to the EU are increasing, while exports to the United States are decreasing. The country appears to be shifting focus toward TCI, start-ups, and financial services rather than business services. More of Brazil's employment is in IT than BP.

Chile and Peru have a more Asia-Pacific–focused strategy, with increasing exports to China and Japan.

Chile also formed a Digital Economy Partnership Agreement with New Zealand and Singapore.[31] Chile's OBS/TCI balanced export value was $2.4 billion in 2021 and Peru's was $1.3 billion. Chile and Peru have the same top three export destinations (United States, China, Japan). Peru's exports are almost entirely in business services. India is one of Peru's top three sources of OBS/TCI imports, and values are increasing. China is a top three import source for OBS/TCI in Chile and Uruguay, and imports are increasing. Like Argentina, Chile has a sizable share of employment from domestic firms. Behind Brazil and Mexico, Chile is the top destination for data centers and CSPs. The Chinese firm Huawei has been a significant investor. Sonda and Huawei are partnering on several projects in Brazil, Chile, and Colombia [10].

LAC countries can also be grouped based on size and participation. The first group accounts for most of LAC's activity, which includes the region's largest countries by population and top exporters (Brazil,

Mexico, Argentina) and smaller countries (Costa Rica, Colombia, Chile, Uruguay). The second group consists of smaller countries, focused on BPO services including Jamaica, Guatemala, Peru, and Panama— and to a lesser extent, other Central American countries and a few Caribbean countries with some contact centers. Remaining countries are not participating in digital services in a meaningful way and can be considered at an entry stage.

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[30] Perhaps a TTOBS firm left Brazil or relocated to Argentina or Colombia. Argentina's OBS imports have been flat since 2015 and Colombia's declined, while Argentina's exports to Brazil have increased.

[31] Negotiations were concluded and the Agreement was signed in 2020. It seeks to establish new approaches and collaborations regarding digital trade issues and promotes interoperability among regimes [70].

Table 5 summarizes firm types and LAC countries with global and regional firm investors as well as drivers of FDI, which is further discussed in the next section, beginning on page 27.

3.3. Potential Opportunities by Segment and Business Model

Participation in global value chains entails engaging in export-oriented services to lead firms based in high-income countries. The service providers are primarily foreign-owned firms (SSCs or third-party providers) from the United States and Europe. Participation in regional value chains entails LAC digital IT or BP service firms providing services to other firms in Latin America. References to business models are those introduced on page 8.

3.3.1. BPO

The LAC region remains a popular destination for contact center outsourcing due to labor availability, bilingual skills, lower wage costs, and vicinity to the United States [80]. Similarly, cost reduction continues to be the priority of three-quarters of SSCs, according to SSON's recent survey [83], and Deloitte's survey [26]. BP occupations are projected to decline in the United States over the next decade. Some will be eliminated or replaced with automated technologies; however, some will continue to be offshored. This likely provides a short-term opportunity for LAC countries in export-oriented services related to business models 3 and 4 (SSCs and third-party providers).

Table 5. Investment and Segment by Country

	BPO SSC	BPO third-party contact centers	IT IaaS/PaaS	IT third party	KP SSC
FDI drivers	Cost, skills, incentives	Cost, infrastructure, incentives	Infrastructure, demand	Demand/market size, skills	Advanced skills
LAC countries with foreign investors	Costa Rica, Colombia, Brazil, Argentina	Colombia , Jamaica, Guatemala	Brazil, Mexico, Chile	Brazil, Mexico	Costa Rica
LAC regional/ domestic firms	Argentina, Uruguay	--	Brazil, Mexico	Chile, Uruguay	Chile

Source: Author

3.3.2. IT Services for Domestic and Regional Markets (Business Model 2 or 4)

Demand for managed services will continue to grow due to continuous system evolution, the constant need for network security, and the ongoing shift to a cloud (offsite) networking environment, as well as remote and hybrid workplaces. Foreign invested firms in LAC countries will likely continue to use foreign service providers with global footprints; however, LAC firms need skilled providers that can better align to their needs at lower costs. Argentina and Uruguay are currently the most active regionally in this

area; and, as previously mentioned, regional trade has increased over the last decade, particularly in Argentina, Uruguay, Colombia, and Costa Rica.[32]

3.3.3. Knowledge-Intensive Analytics Software Development and Services

The opportunity for LAC countries is to increase uptake and demand in the LAC region (business models 1 and 2). In consumer markets, large retailers, e-commerce, and mobile app companies have access to a considerable amount of data. Regional fintech and media firms are also key data holders. This will help LAC develop more competitive domestic firms across sectors. A larger labor force with advanced digital skills, combined with greater domestic demand, will also improve potential foreign investors' perception of the region as an offshore destination.

Existing LAC-based service providers can seek out partnerships with foreign firms with global customer reach to increase awareness and a larger customer base. Global firms list key technology and service partners by region on their websites; however, a general observation upon reviewing these firms' websites is a limited number of firms in LAC.

LAC firms may be able to use an industry-specific approach to enter and increase participation by providing services in select industrial sectors. Chile and India have increased participation in global industries using this strategy, based on experience in mining and pharmaceuticals, respectively. Other Latin American countries may be able to enter global markets by taking advantage of industry expertise in the country and forming partnerships with global firms to expand. Large domestic firms and significant domestic industrial sectors are key entry points. Across Latin America, mining, agriculture, livestock, and food processing are sizable industrial sectors with regional firm ownership. Argentina, Brazil, Chile, and Colombia all have sizable agricultural industries which may present opportunities for analytics. Uruguay, Argentina, Colombia, and Chile have programs in health and medical data.[33]

4. Considerations for Increasing Participation

Reports and indices that provide requirements, scores, and benchmarks of areas considered important to competitiveness—specifically in digital services—were reviewed to identify common indicators (Table A.4). Commonalities include digital infrastructure, digital skills, digital financial services, digital businesses, and the business environment. As an offshore destination for foreign investors, cost competitiveness, workforce availability, a stable and supportive business environment, and market size (for IT) are key. Information for each of the main LAC countries related to these areas is presented in Table A.3.

Entry requires foundational aspects of participation, including infrastructure, workforce skills, and supportive institutions (such as industry strategies and policies related to

[32] High, increasing TCI imports in most LAC countries—particularly Colombia, Chile, and Peru—may be an indicator of increased demand for IT services. More detailed national trade data are needed to determine whether countries are importing software, infrastructure, or managed services and if trade is between affiliated or unaffiliated firms.

[33] Uruguay established the electronic medical history and digital signature of its entire population through the Digital Nations program. Argentina and the EU cooperate with Colombia on a project financed by Adelante to group and digitalize biometric data [70].

digital business ranging from personal data to electronic signatures). **The main LAC countries generally have these business environment factors in place related to digital services and lack overly restrictive policies that may limit growth** (although the strength of individual country policies requires further evaluation). Most countries beyond those profiled in this report still need to focus on entry requirements. Beyond entry, the importance of each area varies depending on whether the objective is to attract export-oriented foreign investment or build a regional market.

4.1. Foreign, Export-Oriented Investment

Cost competitiveness and availability of workers with necessary skill sets are key factors considered by foreign investors for export-oriented services. MNEs often refer to reports and surveys by consulting companies to identify potential investment locations for digital services and to provide a baseline assessment of countries' competitiveness and desirability as an investment location. Being included in such indices and relative rank are important for country perception and marketing. For example, a potential foreign investor may only consider the countries included in the index as a starting point for further investment exploration. If a country is not included, it may never be considered.

Table 6 provides ranks for select countries based on two such reports in two years. Kearney puts more emphasis on financial attractiveness, whereas Tholons puts more on digital innovation.

Tholons [91] factors and weights include digital and innovation (40%), followed by risk, cost, and business environment factors (45%), and skills/scalability (15%).[34] Tholons also considers the share of the total population of a country that lives in top-performing digital cities. Kearney's [4] factors include financial attractiveness (35%), business environment (25%), people skills and availability (25%), and digital resonance (15%).

Location competitiveness indices have increased emphasis on digital innovation in recent years. This has led to high-income countries being added to the top country list and moving up in rank. Meanwhile, several LAC countries fell in rank, including Chile, Costa Rica, Argentina, and Peru. LAC countries all score in the lower half of countries ranked in 2021 for digital resonance (Uruguay ranked the highest at 29 out of 60 for digital resonance), which, combined with lack of improvement in other areas, led to similar or lower scores. Brazil and Mexico held their positions due to their business environment scores improving and stability in other categories. Asian countries also do not perform as well in a digital-centric scenario. Malaysia, Indonesia, and Thailand rank among the top 10 in Kearney's, but are much lower in Tholons across years.

Table 6. Ranks of Global Locations for Offshore Services

Country	Kearney [4]	Kearney [3]	Tholons [91]	Tholons [90]
India	1	1	1	1
United States	7	22	2	3
China	2	2	--	--
United Kingdom	8	19	5	6
Philippines	9	7	6	5

[34] Tholons published new indices in 2021 and 2023, but factors are less focused on digital services. Tholons does not include a financial cost factor in 2023 and ranks for Southeast Asian and LAC countries fall significantly.

Brazil	5	5	3	2
Indonesia	4	4	20	20
Malaysia	3	3	27	26
Vietnam	6	6	9	13
Thailand	10	8	26	27
Mexico	11	13	8	8
Colombia	13	10	12	11
Chile	24	9	14	12
Peru	36	20	44	42
Argentina	45	36	13	10
Costa Rica	48	31	29	28
Uruguay	49	46	18	18
Panama	54	41	47	45
Trinidad and Tobago	55	40	--	49
Jamaica	--	43	50	50

Top LAC performers are Brazil, Mexico, and Colombia (rank staying the same over time and included in the top 15 in both indices). The next group includes Chile, Argentina, Uruguay, Costa Rica, and Peru (ranked differently); Tholons ranks Chile, Uruguay, and Argentina much higher. Among LAC countries, Uruguay has the highest digital resonance rank, followed by Brazil and Mexico. Peru leads for financial attractiveness, followed by Colombia and Brazil. Chile's and Costa Rica's financial attractiveness is declining. Brazil, Mexico, and Argentina are leaders for people skills and availability. Chile, Uruguay, and Costa Rica lead for business environment [4]. In Tholons, Chile and Brazil have the best scores for innovation and digital. All LAC countries have above-average scores for cost/infrastructure. Brazil and Argentina are the highest for talent quality; Costa Rica and Uruguay scored the best for business environment. Only Brazil, Mexico, and Colombia have more than one top-performing city [91].

Regional analysis of Kearney's factors shows that South and East Asian countries collectively have the highest overall scores and score the highest for financial attractiveness and people skills and availability. Developed countries have similar people skills and availability, but are less financially attractive. They also have the highest digital resonance and business environment scores. Eastern European/Central Asian countries have the second highest scores for business environment, but lower people scores. Latin American and African countries are collectively mediocre across categories. They are financially more attractive than developed countries, but have lower scores for people skills, business environment, and digital resonance. While firms will continue to operate in LAC to provide services to domestic firms and foreign investors, the results suggest LAC lacks a driving motivator to attract offshore/outsourced activities. Low costs can be easily eroded by limited digital capabilities and people skills.

SSON's future location report uses a different approach; it surveys shared services organizations to identify their priorities when selecting a location and asks them to rank

regions' strengths in each area [81]. The most recent report analyzes nine geographic regions across six categories: cost-effectiveness, workforce availability, specific skills availability, customer centricity, productivity/efficiency, and agility/innovation. Overall Latin America ranked eighth, only above the Middle East and Africa. Of the six categories, Latin America ranked the lowest for its ability to provide specific digital skills. Only 10% of respondents felt that digital skills availability was a value offered by the region. Agility/innovation and customer centricity were also weak areas. On the other hand, **79% of respondents felt Latin America provides value in terms of cost (ranked second overall); workforce availability was the next strongest area.**

It is also relevant to consider foreign investors' global strategies when evaluating locations. Another SSC survey finds that most organizations are multicountry and multifunction [81]. SSCs typically establish an office in each major region in which they do business. Latin America's competition for SSCs is primarily within the Americas, and growth opportunities depend on increasing Latin American demand.

4.2. Foreign and Domestic Investment

Different aspects of infrastructure, skills, and the business environment are relevant to attracting foreign and domestic investment.

Digital infrastructure is important for global, regional, and domestic opportunities. It is the enabling building block for providing and using digital services. Infrastructure includes first-mile, middle-mile, and last-mile connectivity, connection quality and speed, data and device affordability, and appropriate, transparent regulations.

Availability of a reliable, quality internet connection is instrumental. In June 2023, the global average was 82 Mbps. Most LAC countries have adequate fixed internet speeds, but there is room for improvement. Mexico, Argentina, and Costa Rica have similar average fixed internet download speeds (61–76 Mbps, June 2023) that fall below the global average. Peru and Colombia were 88–95 Mbps, and Chile has the highest speed (229 Mbps) followed by Uruguay (142 Mbps) and Brazil (117 Mbps).

For export-oriented services, infrastructure is only needed in the geographic area the services are performed. For example, India is among the top global IT service exporters; it started developing software technology parks with the necessary infrastructure and incentives to attract IT investment in the 1990s.

However, as of June 2023, the country also ranked eighty-third for fixed internet download speed (53.2 Mbps), which is below LAC countries. For domestic industry development, the entire country needs to be reliably connected.

Other infrastructure factors—such as mobile coverage, number of individuals using the internet, and the cost of internet and electronic devices—are relevant to domestic demand. Peru has the lowest 4G coverage (81% in 2021), and Colombia the highest (99.5%). Colombia and Mexico are the lowest in terms of individuals using the internet (73% and 76%). Chile and Uruguay are estimated to be the highest (90%). Shares are likely lower in rural areas.[35]

The cost of smartphones and internet do not appear to be significant constraints in the main countries. Mobile broadband is the most expensive in terms of monthly income in

[35] Economist Impact [29] cites that 46% of households in the region have access to broadband. In rural areas, only 23% of households are connected, as opposed to 67% in urban areas.

Colombia and Peru, but all countries are below the monthly expenditure threshold.[36] Smartphones account for the highest share of monthly income in Argentina, Colombia, and Peru (Table A.3).

4.2.1. Skills and Workforce

A key concern regarding education is the low share of the population with advanced degrees. Most digital service occupations are high skill and often require at least tertiary education, while many tend to have advanced degrees in high-end IT and across KP occupations. Costa Rica has the highest share of population ages 25–64 with a master's or doctoral degree (2.9%), followed by Chile (2.2%), Mexico (1.9%), Argentina (1.4%), and Brazil (1.1%).[37] To put this in perspective, the share in the United States is 14.4%, and the OECD average is 15.1%. For IT-related occupations, firm and technology-specific certifications are potential substitutes for formal advanced education. However, the workforce must be aware of these certifications and capable of remote learning.

It is also relevant to consider graduate fields of study. Science, technology, engineering, and math (STEM) and ICT graduates are often used as broad educational benchmarks.[38]As a point of reference, 4.7% of U.S. graduates were in ICT (2020) and 19.6% were in STEM fields. Peru and Mexico have comparable or higher shares of graduates as the United States in ICT and STEM. Costa Rica had a higher share of ICT graduates than the United States, and Colombia and Chile have higher shares in STEM.

Several countries have created digital skill development programs. Mexico, Uruguay, and Chile have had IT/BP skill development programs for over a decade (Table A.3). The government of Costa Rica, CINDE, and Coursera enabled 23,000 Costa Ricans to enroll in online courses [23], and Colombia's Mission TIC (2020) supports educational costs for programmers who meet qualifications.

Global technology firms develop accelerators, incubators, and certification programs to foster the development of future technologies and a workforce with the skills to use their products and services. For example, Google agreed to train 3,500 Chileans in technology skills, with a focus on upskilling unemployed young graduates; it also intends to finance training in Argentina, Colombia and Mexico [9]. Oracle is providing training to 40,000 Latin Americans [6]. TCS and IBM have similarly invested in training local workers across LAC. LAC countries should continue to seek out partnerships with these firms to ensure the workforce pursues relevant skills. Such firms can also help with national skill development programs, occupational profiles, and formal education programs.

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[36] The UN Broadband Commission for Sustainable Development suggests entry-level broadband services should not cost more than 2% of monthly GNI per capita (ITU & A4AI, 2021).

[37] LAC countries other than Argentina have a slightly higher share of the population ages 25–34 with tertiary education. Tertiary education statistics also include short-cycle education. In Costa Rica and Chile, short cycle is 10.3% and 11.1%, respectively (educational attainment of 25- to 34-year-olds in 2020–2021). In Argentina and Brazil, none of the population with tertiary education is short cycle.

[38] Future analysis should seek out more detailed national data on graduates and programs, particularly in emerging educational disciplines that crosscut technology and management.

4.2.2. Business Environment

Key aspects of a supportive business environment include a strategy; an industry association; ensuring support is industry specific; public leadership; a public-private council and coordinator; working groups; and an implementation plan, team, and budget. The main LAC countries have capabilities in the first three areas.

All main LAC countries have a strategy related to digital transformation and one for AI (Table A.3). Several countries have had IT/BP initiatives since the early 2000s (Chile, Mexico) or the late 2000s/early 2010s (Colombia, Uruguay, Costa Rica). Costa Rica is frequently recognized as a successful example of entering higher-skill, higher-tech industries and for its effective business environment. All main countries also have an industry association for IT and/or BP-related businesses; however, the information provided by these organizations regarding the scope and size of industry activities is limited. LAC countries also all have government plans and strategies to addresses digital literacy for students and training for teachers [30].

Simply having a strategy, policy, or association is insufficient, however. Strategies must be coordinated (in terms of stakeholders and with other existing strategies/plans at the national, industry, or focus area), have clear leadership, include implementation plans with dedicated personnel to coordinate, monitor, and enforce implementation, and have budgets with sustainable funding sources [38] [28]. Priorities and objectives must be realistic and achievable.[39] Each strategy should be evaluated for these key elements to ensure effectiveness.

National digital/data strategies and regulations affect economic development and should be considered in tandem and with intention. As described by UNCTAD [98], the United States, the EU, China, India, and Russia have taken different approaches. The United States has a free-market approach which gives decision-making power to the private sector. U.S. firms are also global technology leaders and benefit from cross-border data flows. China has a government-centric approach, while the EU supports the individual's right to choose. India's approach seeks to ensure domestic data benefit domestic firms. The remaining countries, including LAC countries, are in similar situations—they are not global technology leaders, they do not have domestic markets large enough to build sizable companies in-house to immediately service global markets, and they do not have the government capacity to control all digital activity. As a region, Latin America has sufficient demand to warrant development of regional products and firms, but individual countries must be willing to cooperate on regulations and economic development initiatives for this to succeed. **In the absence of regional coordination, countries can seek a regulatory strategy that enables individuals to have the ability to determine how their personal data are used while also supporting domestic firm development.**

4.3. Domestic and Regional Market

Demand for digital services is a key driver for development of domestic and regional markets. As previously mentioned, increasing the share of the general population with basic digital skills, and ensuring electronic devices and internet prices are affordable, are relevant to increasing the consumer data necessary to generate demand for analytics software and services. E-commerce laws, digital IDs, open data policies, and data

[39] For example, Chile's AI policy and action plan has quite an aggressive 70 priority measures and 185 initiatives.

portability rights are all aspects of the business environment that can help enable development of domestic and regional markets.

A data strategy is now an integral business function. Digital activity and transactions are the foundation of big data, analytics, machine learning, and AI. It is important for existing and future Latin American companies across sectors to recognize the importance of actively collecting, analyzing, and learning from data across business functions. Otherwise, global firms that are collecting and using data will drive domestic and regional markets. Supporting and educating existing firms on digital data collection and analysis and supporting start-ups in this space are key elements of creating vibrant domestic and regional markets.

The number of accelerators, start-ups, and venture capital in the region is growing, but still limited. The start-up ecosystem is strongest in Brazil, followed by Mexico, Chile, Colombia, and Argentina; then Uruguay, Peru, and Costa Rica [85] [84]. Eleven LAC countries were in the global top 100 in 2022 and 2023. However, only four countries increased their standing, with the rest declining. Latin America as a region ranked the lowest in terms of start-up funding and the second lowest in terms of number of start-up cities. Latin America had 77 cities in the top 1,000 and 2.2% of start-up funding; the Middle East and Africa had 63 cities and 3.7% of start-up funding [85]. More seed ecosystems are emerging, though, as Latin America only had 60 cities in the top 1,000 in 2022 [85].

More than 70% of the region's funding is captured by three countries: Brazil (43%), Mexico (14%), and Colombia (13%). Sao Paulo has attracted more tech start-up investment than Chile, Colombia, Argentina, and Mexico combined [4]. Colombia, Costa Rica, and Argentina have created digital nomad visas to encourage foreign remote work tourism, while Uruguay is encouraging foreigners to the country to fill tech-related job vacancies [12] [7]. Startup Chile is often touted as a successful model to promote entrepreneurship, and several other LAC countries have created similar national or subnational programs (Table A.3).

While several LAC firms have been acquired by U.S. firms, LAC start-ups do not seem to grab the attention of corporate venture capital. Most top global MNEs now have corporate venture capital arms that actively seek out promising tech investments [39]. Many also have accelerator or incubator programs to promote skill and entrepreneurial development. For example, Google for Startups in Brazil has been a fruitful source of incubation. When it was established in 2016, there were no start-ups valued at $1 billion or more in the region. As of October 2022, there were 35—13 of which participated in Google for Startups. The program has supported more than 450 start-ups in the region. These start-ups have created 25,000 jobs, and many provide their services across borders [15].

Use of digital financial services is important for increasing domestic and regional demand for digital services. E-commerce, for example, requires consumers to have digital banking/e-wallet accounts.

Financial service imports are increasing in Brazil, Costa Rica, Colombia, and Chile [73], which likely indicates increased use of digital financial services. Fintech has been a popular area for LAC start-ups; particularly LAC unicorns. Mexico, Colombia, Paraguay, Peru, Uruguay, and the Dominican Republic are also part of the Better than Cash

Alliance, a multilateral cooperation organized by the UN and including countries around the world that aims to accelerate the transition to digital payments [70].

4.3.1. Regulations

The OECD Digital Services Trade Restrictiveness Index (DSTRI) seeks to identify barriers to digital trade across 85 countries in 2022. Costa Rica and Mexico (as well as Ecuador and the Dominican Republic) were among the least restrictive countries, but other LAC countries rank in the bottom quadrant. China (71) and India (77) also rank in the bottom, yet they are also the only non-high-income top IT and digital business service exporters.

Over half of the index score pertains to the infrastructure and connectivity category, which has a more direct impact on domestic development than trade. Within this category, half of the indicators pertain to how fixed and mobile operators are regulated in a country, which are the primary restrictions for LAC countries.38 Restrictiveness is based on whether interconnection is mandated, interconnection prices/ conditions are regulated, interconnection reference offers are made public, and vertical separation is required. Restrictions on telecommunication services can lead to less affordable or lower-quality internet access. While LAC countries have room for improvement, internet cost and speed do not appear to be key limitations.

All main LAC countries have data protection laws and regulations on personal cross-border data flows. Cross-border transfer of personal data is possible when certain private sector safeguards are in place in all main LAC countries. If a country has further provisions, they are considered restrictions.[40] Brazil has case-by-case regulations related to financial services. Brazil and Mexico have instances in which data must be stored locally for certain types of public procurement contracts or telecommunications data.

Other restrictions include required local presence in some capacity to provide cross-border services in Argentina and Peru. LAC countries are not parties to the UN Convention on the Use of Electronic Communications in International Contracts; this is a restriction because national contract rules for cross- border transactions deviate from internationally standardized rules.

Regional coordination is important to enable domestic firms to serve the LAC market. Coordination related to policies on payment systems, professional licenses, and regulation of cross-border services will help create a stronger regional market [78]. Strengthening regional digital cooperation and integration is the intended purpose of the Ministerial Conference on the Information Society in Latin America and the Caribbean [28]. Economic Commission for Latin America and the Caribbean (ECLAC) measures to build a regional digital market include establishment of a collective strategy to increase trade, integration of infrastructure and development of digital platforms, and regulatory consistency to facilitate cross- border data flows and trade. Steps toward regulatory convergence and cooperation have started within subregional groups, such as the Pacific Alliance and the Southern Common Market (MERCOSUR).[41] These groups should include smaller blocs within the region such as the Central American Common Market and the Caribbean Community (CARICOM). Both stand to gain from collaboration, as it would

[40] Indicators are scored differently based on whether there are operators with dominant market share in a country for fixed and mobile operators. Most countries in the index have a dominant provider of fixed and mobile services. LAC exceptions include Colombia for fixed services and Argentina, Chile, and Peru for mobile services.

[41] These include the Pacific Alliance Roadmap for the Regional Digital Market, the MERCOSUR Digital Agenda Action Plan, and the Andean Community's Andean Digital Agenda.

expand the market for larger blocs and provide regulatory development capacity for smaller ones.

APPENDIX TABLES

Table A. 1. Service Categories World Trade Values, trillion $ (2022)

Level	BPM6/EBOPS10 Code	IT/BP/KP	Definitions including code	UNCTAD or WTO[1]	BaTIS OECD or WTO	
				Exports	Exports	Imports
	Total services			6.1	6.0	6.0
	Commercial services			6.0	5.9	5.9
L1	12. Government services	n/a		0.1	0.1	0.1
L1	5. Construction	n/a	n/a	0.1	0.1	0.1
L1	6. Insurance & pension services	n/a	DDS, PICT	0.18	0.2	0.2
L1	7. Financial services	n/a	DDS, PICT	0.63	0.5	0.5
L1	8. Charges for use of IP	n/a***	DDS, PICT	0.452	0.5	0.5
L1	9. Telecommunications, computer, information	IT; BP	DDS, PICT	0.896	0.7	0.7
L2	9.1 Telecommunications	IT	DDS, PICT	0.098	--	--
L2	9.2 Computer services	IT	DDS, PICT	0.750	--	--
L2	9.3 Information services	BP	DDS, PICT	0.048	--	--
L1	10. Other business services		DDS	1.596	1.6	1.6
L2	10.1 R&D services	n/a**; KP	DDS, PICT	0.218	--	--
L2	10.2 Professional & management consulting	n/a; KP; BP	DDS, PICT	0.700	--	--
L3	10.2.1 Legal, accounting, mgmt. consulting, PR	n/a; KP; BP	DDS, PICT	*0.525	--	--
L4	10.2.1.1 Legal services	n/a; KP		+0.050	--	--
L4	10.2.1.2 Accounting, auditing, bookkeeping, and tax consulting services	BP		+0.050	--	--
L4	10.2.1.3. Business and management consulting and public relations services	n/a; KP		+0.425	--	--
L3	10.2.2 Advertising, market research, public opinion polling	n/a; BP	DDS, PICT	*0.175	--	--
L2	10.3 Technical, trade-related, & OBS	n/a; BP	DDS	0.678	--	--
L3	10.3.1 Architectural, engineering, scientific, & other technical	n/a**	DDS, PICT	0.168	--	--

L3	10.3.2 Waste treatment & depollution, agricultural & mining	n/a**	DDS	0.032	--	--

Sources: Reported values: [95] and [114]; BaTIS [113]; [73] (balanced values). OECD and WTO BaTIS values are the same.

Note: Blue rows are the categories most likely to represent outsourced digital business processes considered in this report. Other OBS categories are not business process services, or the value of the service is not primarily digitally derived. PMC activities (L2) are knowledge-intensive, business-related processes that may be IT-enabled but are also services that require tacit knowledge. Trade is dominated by interactions among developed, high-income countries. R&D services and architectural, engineering, scientific, and other technical services are knowledge-intensive, but are not necessarily business process services or digitally enabled. * Value calculated by author based on available data in WTO/UNCTAD. For 11.2 Other PCR, the value for 11.1 was published in 2021, and there are only two L2 categories. For 10.2.2., the value was published in 2020, and it accounted for 25% of the value of 10.2 (which only includes two L2 categories). The listed values allocate 75% of category 10.2 to 10.2.1 and 25% to 10.2.2 in 2021. ** Code is too broad to be considered an IT/BP/KP digital service, but a portion of the value would include vertical, industry-specific KP activities. *** Charges for IP related to licenses for software is an indicator of using software, but trade in this category does not represent developing the software. + Values estimated based on reported L4 values in 2020 and shares of the L3 2020 total applied to 2021.

(1) WTO includes some L3 and L4 estimates, but UNCTAD does not.
(2) U.S. BEA only considers 11.1.1 Audio-visual related services to be PICT, but the value of 11.1.2 Artistic-related services only accounts for 3% of U.S. exports in 11.1. World values are not available for 11.1.1 or 11.1.2.
(3) L3 codes exist, but no world dataset includes values: 11.2.1 Health services, 11.2.2 Education services, 11.2.3 Heritage & recreational services, 11.2.4 Other.

Table A. 2. Global Firms and Market Size Estimates by Segment

Segment/Global Firms		Global market (billion $, 2022)
CSPs/hyperscalers	Microsoft, Amazon, Google, Huawei	$67
Third-party IT-managed services	Infrastructure/network focused: Fujitsu, Kyndryl, DXC, HCL, NTT Security: Atos, SecureWorks (former Dell) Communication: Cisco; Mobility: Capgemini	$260–$550
Third-party IT consulting and application services	Accenture, IBM, CTS, TCS, Infosys, Wipro	$235
Third-party BP services	Contact centers: Teleperformance, Foundever, Alorica, Tellus, TTEC, Atento Human resources: ADP, Paychex, Willis Towers Watson, KellyOCG, Manpower Group, Mercer Document management: Iron Mountain, Xerox Finance and accounting: SD Worx Broad based (IT/BP): Accenture, Concentrix, TCS Broad based (BP): Genpact, Konecta, WNS, Startek	$250–$450
Third-party KP services	No dominant global firms Cloud professional services: Deloitte, EY, PWC Broad based (IT/BP/BP): Accenture, IBM Analytics consultancies: ZA, Perficient	$25–$50
Software	Microsoft (operating system, productivity); Salesforce (customer relationship management); SAP, ServiceNow (enterprise resource planning); Oracle, IBM (middleware/database); Cisco, VMWare (IT/ security); Adobe (design/content creation); Workday (human resources)	$650–$1,177
Big data/analytics software	Qlik/Talend, MongoDB, Cloudera, Snowflake, Informatica, Databricks, Alteryx, Exasol, UiPath, Altair	$100

Sources: Market estimates (billion $): CSP: IaaS [58]; Third-party IT-managed services: infrastructure services; $547 (2022) without cloud computing [59]; managed services $257 (2022) [66]; IT consulting and application development: application:
$235 (2022) [59]; PaaS $57 (2022) [58]; Third-party BP services: [33] [56]; teleperformance 2023); Third-party KP services:
$46 (2022) [56]; cloud professional services $22 (2022) [65]; big data professional services $40 (2021) [63]; enterprise data
management services $26 (2020) [62]; Software: [60]; SaaS: $221 (2022) [58]; Big data/analytics software: big data software (2022) $124 [67]; data and analytics software (2022) $90 [60]; Advanced analytics (AA) software $32 (2022)
[64]; analytics as a service software $42 (2021) [14]; enterprise data management software $52 (2020) [62].
Note: Service firms represent business model 4 (third-party MNE providers); software providers are primarily U.S. based.

Table A. 3. LAC Participation Indicators

Indicator	Brazil	Mexico	Argentina	Costa Rica	Colombia	Chile	Uruguay	Peru
DDS exports L1[95]	$22.0	$4.8	$7.0	$6.4	$3.3	$3.4	$2.7	$1.0
DDS L1 balanced exports [113] or [73]	$17.5	$12.7	$6.1	$4.3	$3.6	$3.7	$2.3	$1.8
OBS & TCI balanced exports[73]	$13.3 ↓	$9.8 ↑	$4.2 ↑	$4.1 ↑	$2.4 ↑	$2.4 ↑	$1.8 ↑	$1.3 ↑
OBS & TCI balanced export destinations[73]	US: 31% ↓ UK: 7% ↑ Germany: 5% ↓ LAC: 7% ↓	US: 43% ↑ Switzerland: 7% Netherlands:6% ↑ LAC: 3% ↑	US: 24% ↓ Brazil: 8% ↑ UK: 6% ↑ LAC: 24% ↑	US: 56% ↑ UK: 5% ↑ Mexico: 5% ↑ LAC: 13% ↑	US: 42% ↑ Switzerland:6% ↑ UK: 5% ↑ LAC: 13% ↑	US: 18% ↑ China: 14% ↑ Japan: 10% ↑ LAC: 10% ↓	US: 19% ↑ China: 9% ↑ Argentina: 7% ↑ LAC: 20% ↑	US: 20% ↓ China: 10% ↑ Japan: 10% ↑ LAC: 9% ↑
Balanced export category value, shares, & trend[73]	OBS: $11 ↓ 63% TCI: $2 ↑ 13% FS: $2 ↑ 11% IPS: $1 ↑ 5% CIP: $1 ↑ 5%	OBS: $8 ↑ 63% TCI: $2 ↑ 14% PCR: $1 ↑ 6% CIP: $1 ↑ 6% FS: $1 ↑ 6%	OBS: $3 ↑ 51% PCR: $2 ↑ 25% TCI: $2 ↑ 18% FS: $0.2 ↑ 3% CIP: $0.1 ↓ 2%	OBS: $3 ↑ 77% TCI: $1 ↑ 18% FS: $0.1 ↑ 3% IPS: $0.04 ↑ 1% CIP: $0.03 ↑ 1%	OBS: $2 ↑ 51% PCR: $1 ↑ 26% TCI: $1 ↑ 14% FS: $0.2 ↑ 4% CIP: $0.1 ↑ 3%	OBS: $2 ↑ 52% TCI: $1 ↑ 15% PCR: $0.5 ↑13% IPS: $0.4 ↑ 10% FS: $0.3 ↑ 8%	OBS: $1 ↓ 48% TCI: $1 ↑ 33% FS: $0.2 ↑ 9% IPS: $0.1 ↑ 5% PCR: $0.1 ↑ 4%	OBS: $1.1 ↑ 63% FS: $0.2 ↑ 10% TCI: $0.2 ↑ 9% PCR: $0.2 ↓ 9% CIP: $0.1 ↑ 6%
OBS export subcategories[95]	TTOBS: $10 ↓ PMCS: $5 ↑ R&D: $0.7 ↑	OBS: $0.4 R&D: $0.4 ↑ --	PMCS: $2 ↓ TTOBS: $1.5 ↑ R&D: $0.5 ↑	PMCS: $4 ↑ TTOBS: $0.6 ↑ R&D: $0.2 ↑	TTOBS: $2 ↑ PMCS: $0.5 ↑ R&D: $0	OBS: $2.1 ↓ -- --	PMCS: $1 ↓ TTOBS: $0.1 ↑ R&D: $0	PMCS: $0.6 ↑ TTOBS: $0 R&D: $0
TCI export subcategories[95]	CS: $2.7 ↑ TS: $0.5 ↑	TCI: $0.1 --	CS: $2.0 ↑ TS: $0.1 ↓	CS: $1.3 ↑ IS: $0.1 ↑	CS: $0.5 ↑ TS: $0.1 ↓	CS: $0.5 ↑ TS: $0.1 ↓	CS: $1.1 ↑ TS: $0.2 ↑	TS: $0.1 ↓ CS: $0.1 ↓
DDS imports L1[96]	$32.3 ↓	$14.4 ↑	$7.3 ↔	$2.3 ↑	$6.6 ↔	$6.8 ↑	$2.4 ↑	$4.1 ↑
Balanced DDS-L1 imports[113] or [73]	$31.8 ↓	$25.4 ↑	$7.6 ↔	$1.9 ↑	$6.7 ↑	$8.9 ↑	$2.3 ↑	$3.9 ↑
OBS & TCI balanced imports[73]	$20.4 ↓	$11.7 ↑	$4.7 ↑	$0.9 ↑	$3.3 ↑	$5.3 ↑	$1.6 ↑	$2.2 ↑
OBS & TCI balanced import sources[73]	US: 40% ↑ India: 8% ↑ Netherlands: 7% ↓ LAC: 4% ↑	US: 38% ↑ Ireland: 8% ↑ Germany: 5% ↓ LAC: 5% ↑	US: 39% ↑ Ireland: 5% ↑ Netherlands : 5% ↓ LAC: 11% ↓	US: 38% UK: 7% Ireland: 6% ↑↑ LAC: 9% ↑	US: 39% ↓ India: 5% ↑ Spain: 5% ↑ LAC: 13% ↔	US: 36% ↑ China: 8% ↑ Ireland: 8% ↑ LAC: 7% ↑	US: 29% ↑ Argentina: 9% ↓ China: 6% ↑ LAC: 17% ↑	US: 37% ↑ UK: 7% ↑ India: 6% ↑ LAC: 9% ↑
OBS imports[96]	TTOBS: $14 ↓ PMCS: $3.4 ↑ R&D: $0.1	TTOBS: $2.7 R&D: $1.0 ↑ PMCS: $0.2	TTOBS: $1.6 PMCS: $1.3 R&D: $0.05	PMCS: $0.6 ↑ TTOBS: $0.1 R&D: $0.1 ↑	TTOBS: $0.8 ↓ PMCS: $0.6 R&D: n/a	OBS: $2.8 ↔	PMCS: $1.0 ↔ TTOBS: $0.1 R&D: $0	PMCS: $1.8 ↔ TTOBS: $0 R&D: $0
TCI imports[96]	CS: $5.6 ↑ TS: $0.7 ↑	CS: $0.6 TS: $0.1 ↓	CS: $1.5 ↑ TS: $0.3 ↓	CS: $0.1 ↑ TS: $0.2 ↑	CS: $0.9 ↑ TS: $0.2 ↓	CS: $0.8 ↑ TS: $0.1 ↔	CS: $0.7 ↑ TS: $0.1 ↓	CS: $0.4 ↑ TS: $0.4 ↔
Main activities	IT	IT & BP KPO[36]	IT/BP/KP	BP/KP	BP	BP & IT; call center to high IT, KPO R&D[36]	IT BP (finance and accounting, SCM)	BP for Americas; IT
Firm type	Third-party IT for domestic market	FDI; captive & third-party IT	Domestic; third party	FDI; captive	FDI; third-party BP	Domestic	FDI; captive	FDI
Total BP/IT employment	999,908 (2021)[16] 100,000 (2022)[r]	230,500 (2016)[40]	17,000 (2016)[40]	55,000 (2019)[r] 42,500 (2016)[40] 33,000 (2008)[36]	25,400 (2016)[40]	11,200 (2016)[40] 20,000 (2008)[36]	77,000 (2022) 19,482 (2014; 2016) 20,000 (2008)[36]	80,000 (est.)
BP employment	218,764 (2021)[16]	175,720 BPO (2020)[86]		34,800 BPM (2014) 4,600 KPO (2014)[89]	710,000 (BPO)	23,000 (2022)[47]	45,805 nonvoice 4,103 voice[101]	50,000 (2022)[13]

IT (software and/or services) employment	500,000 (2021)[z] 781,144 (2021)[16] 137,988 software 643,156 ITS	225,000 (2021)[z] 450,000 (2020)[17]	115,000 (2021)[z] 127,908 (2021)[77] 132,282 (2021) software[20]	7,000 ITO (2014)[89]	62,000 (2021)[z]	61,000 (2021)[z] 9,200 (2022)[47]	27,400 (2022)[103]	
ICT professionals & technicians (thousands)[44]	1,364 (2022)	644 (2022)	235 (2021)	37 (2022)	262 (2022)	113 (2020)	32 (2022)	30 (2022) ISIC4-62[43]

Indicator	Brazil	Mexico	Argentina	Costa Rica	Colombia	Chile	Uruguay	Peru
Industry Associations	Brazil Association of Software Companies (ABES) Brasscom (IT)	National Chamber of Electronics, Telecommunica- tions, & Information Technologies (CANIETI); AMITI	CESSI; Argencon	CINDE Digital Technologies & Corporate & Business Processes	Colombia BPO Association (BPro)	ACTI Chiletec Chilean Association of Call Center Companies	Uruguayan Chamber of Information Technologies (CUTI)	APEBIT
Investment Attraction/Export Promotion	ApexBrazil	Invest in Mexico	Promocion ARG	Procomer; CINDE	ProColombia; Invest in Colombia; IT & Creative Industries	InvestChile ProChile	National Export Promotion & Investment Attraction (Uruguay XXI)	PromPeru
Key government agency	Ministry of Science, Technology & Innovations (MCTI)	Ministry of Economy Office of the President (digital strategy coordination & elaboration of plan)	Ministry of Science, Technology and Productive Innovation	Ministry of Science, Technology and Telecommunications (MICITT) implementation, coordination, and follow-up of plans.	Ministry of Information & Communications Technologies (MinTIC) Ministry of Commerce, Industry, & Tourism (MinCIT) DNP: CONPES3	Ministry of Science, Technology, Knowledge, and Innovation; CORFO	National Agency for Research and Innovation (ANII) Agency for E-Government & the Information & Knowledge Society (AGESIC)	High-Level Commission for multisectoral coordination and the Digital Government Secretariat of Peru
IT/BP National Strategies		PROSOFT (2002–present), Ministry of Economy		CINDE High-Skill Industry focus (late 2000s)	BPO strategy (2008/2010)	2004–06 Digital Plan (led by ProChile)	Global Services Export Program (GSP): 2012–17 (UYXXI)	Agenda Digital 2.0, launched 2011
National digital strategies[70]	Brazilian Digital Transformation Strategy. E-Digital (2018)	National Digital Strategy	Digital Agenda 2019	National Telecommunications Development Plan 2015–21 and Digital Transformation Strategy toward the Costa Rica of Bicentennial 4.0 2018–22	2018–22 ICT Plan & 2018–22 NDP	Digital Chile for everybody 2020 Chile Digital 2035	Uruguay Digital Agenda 2020 (incl. Digital Government Strategy 2020); Uruguay Digital Agenda 2025 (2021) (AGESIC)	National Plan for Competitiveness and Productivity 2019–30 and Law of Digital Government of 2018 (approved by legislative Decree No. 1 412 of 2018)
AI strategies[75][4]	MCTI AI Brazilian Strategy for AI 2021	AI Strategy 2018	AI National Plan (2019)		Digital Transformation & AI National Policy (CONPES 3975)(2019)	AI National Policy & AI Action Plan (2021)	AI Strategy for Digital Government (2019)	
Digital businesses: accelerators[85] [84]	Public policy initiatives: InovAtiva[29], StartOut Brasil, Capital Empreendedor, Start-Up Brazil Google for Startups (2016)	Startup Mexico Startup Chihuahua	IncuBAte Startup Buenos Aires	Parque Tec & Invert-Up; acceleration programs for digital entrepreneurs[42]	iNNpulsa (2012; export-oriented; MinCIT) Ruta-N (2010) MinTIC/ MinCIT- iNNpulsa: Centers for Business Digital Transformation (CTDE)[5]	Startup Chile (2010 by gov. to help int'l entrepreneurs)[29]		Startup Peru (c); ProInnovate Emprende Up, accelerator at the University of the Pacific; 6-month start-up incubation program[85][84]
Start-up Ecosystem Rank (2022/2023)[85] [84]	26/27	35/37	37/47	67/72	44/40	34/36	56/55	63/69

Venture Capital (VC) funds	Monashees VC (est. 2005) Ace Startups VC Kaszek VC		NXTP VC (VC tech start-ups)		Emprender Fund (est. 2002) (SENA)			Peruvian Seed & VC Association (PECAP) promotes VC investment-local & foreign[85] [84]
Indicator	**Brazil**	**Mexico**	**Argentina**	**Costa Rica**	**Colombia**	**Chile**	**Uruguay**	**Peru**
Framework for digital skills development: support for student & teacher digital literacy[30]	Strategy for Digital Transformation (2018)	Digital Education Agenda ADE. mx (2020)	Juana Manso Plan (2020)		DNP CONPES 3988. Technologies for Learning (2020)[112]	National Plan for Digital Languages (2019)		National Strategy for Digital Technologies in Education 2016–21: ICT to Digital Intelligence
Formal & informal education and training programs	A More Digital Brazil (free IT training courses for ages 16–25)	MexicoFirst: CANIETI (2008–2016) (IT professionals)		Coursera-CINDE collaboration	Mission TIC 2020 Talento TI (2012) scholarship for ICT tertiary ed.	Talento Digital	One Laptop per Child Plan (2007)	Crack the Code (start-up, 2017) offer computer science to K-12
Mean years schooling[99]	8.0 (2018)	9.2 (2020)	11.1 (2020)	8.8 (2020)	8.9 (2020)	10.6 (2017)	9.0 (2020)	9.8 (2018)
Pop. (age 25–34) w/tertiary ed.[71]	23% ↑ (2021)	27% ↑ (2021)	19% ↔ (2021)	30% ↔ (2021)	31% ↑ (2021)	41% ↑ (2020)		
Short cycle	0%	0.6%	0%	10.3%	0–4.3%	11%		
Bachelor's	22%	25%	18.5%	19%	26%	28%		
Master's or Ph.D.	0.9%	1.5%	0.5%	1.4%	0–4.3%	2%		
Master's/Ph.D. (age 25–64)	1.1%	1.9%	1.4%	2.9%	0–2.7%	2.2%		
ICT graduates (%) [99]	3.9% (2020)	4.6% (2020)	1.8% (2020)	5.7% (2021)	3.6% (2021)	3.4% (2020)	2.9% (2020)	5.8% (2017)
STEM graduates[99]	18% (2020)	26% (2020)	14% (2020)	16% (2021)	24% (2021)	21% (2020)	15% (2020)	30% (2017)
Population 4G coverage (2021)[51]	88%	95%	98%	93%	99.5%	88%	92%	81%
Individuals using internet (2021)[51]	81%	76%	87%	83%	73%	90% (est.)	90% (est.)	71%
Ookla speed test 2023 (Mbps)[6]	117.4	60.7	67.4	76.5	94.8	229.5	141.7	87.9
Mobile broadband price (1G); share monthly income[1]	$1.9 0.35%	$10 1.4%	$3.8 0.75%	$6.5 0.7%	$8.1 1.9%	$5.6 0.5%	$6.8 0.6%	$7.9 1.7%
Smartphone price; share monthly income[2]	$44 7%	$49 6%	$131 17%	$75 8%	$65 13%	$61 5%	$92 7%	$52 10%
Financial institution account (2021)[110]	84%	35% (2017)	66%	68%	56%	87%	74%	56%
National cybersecurity policy/plan	E-Ciber (2020)	Yes[111]	Cybersecurity National Strategy (2019)	Law on Cybercrimes 9048 (July 2012)	Law 1273 of 2009[112]	Cybersecurity Policy (2018)	Uruguay Digital 2025	Yes
ITU GCI Score/ Rank 2020[50]	96.6 18	81.7 52	50.1 91	67.5 76	63.7 81	68.8 74	75.2 64	55.7 86
Personal data protection law	General Data Protection Law (LGPD), Law 13,709/2018 (2021 in force)	Law Protection of Personal Data Held by Private Parties LFPDPPP	Personal Data Protection Act Law 25,326 (PDPA)(2000)	Personal Data (2011)[37]	Law 1581 Data Protection Law (2012)[37]	Law 19,628 Chilean Data Protection Law (CDPL)(1999)	Law 18,331 Personal Data Protection Law (2008)[37]	Personal Data Protection Law 29733 (2011)[37] Amendment (2013)

		(2010)						
Indicator	**Brazil**	**Mexico**	**Argentina**	**Costa Rica**	**Colombia**	**Chile**	**Uruguay**	**Peru**
European collaboration[70]	EU-Brazil Agreement for S&T Cooperation (2016)[7]	EC Future & Emerging Technologies program: HPC[8]	International Digital Cooperation project[9]	Connect 2020[10]	Building Europe Link with Latin America (BELLA)[11]	EC Future and Emerging Technologies program: HPC	EU MAGIC project[12]	BELLA
Other collaboration[70]		Digital Nations[13]	Argentine Fund for International Cooperation (FO.AR)		Alliances with 90+ countries[14]	Digital Economy Partnership Agreement (Jan. 2020)	Digital Nations	
Industry/vertical specialization	Ag, food processing, environmental	Logistics/mfg/ auto	Health/food, ag, pharma/ health	Environment, tourism, health	Ag/coffee, transportation, pharma/health	Ag, mining, engineering	Dairy/beef	Mining, education

Note: Blanks indicate information was not available. Values are billion $USD in 2021 unless otherwise indicated. Arrows indicate the general direction of the value of trade in the last five years (increasing, decreasing, stable). -- indicates data is not available for subcategories.

[1] Source: Everest Group Spotlight country-specific report; only considers export-oriented employment by Global In-house Centesrs/ SSCs and third-party providers.

[2] Software developers involved in offshore development in 2021 from Ncube.

[3] Department of National Planning: Consejo Nacional de Política Económica y Social (CONPES)/National Council for Economic & Social Policy.

[4] Also OECD AI Policy Observatory (OECD.AI).

[5] Fourteen in 2019. Help firms bring digital technologies into their operations; evaluate hard and soft skills of firm.

[6] [76]; average fixed-line broadband speed based on user tests. 100 Mbps is considered good for streaming (25 required).

[7] 5G vision, standards, and requirements. Brazil and EU (2008) agreed to expand dialogue and cooperation on ICT matters on policy, regulation, and research.

[8] High Performance Computing (HPC) initiatives develop technology and solutions to improve performance in scientific applications and services. Identify key application areas and hardware and system requirements, international funding schemes, and promote exchange of best practices between EU and research communities in LAC.

[9] Argentina-EU Joint Steering Committee on S&T cooperation (11th meeting, 2019). Develop common principles and framework conditions to create a level playing field to cooperate on research and innovation.

[10] Stimulate cooperation in ICT between Europe and LAC; funded by the 7th Framework Program and part of Latin American Technology Platforms in Innovation project under the EU Horizon 2020 program.

[11] BELLA: long-term interconnectivity needs of research and education networks. Includes 11 European and Latin American research and education networks. Led by RedCLARA (international organization to connect Latin America's computer networks), and GEANT (pan-European research education network).

[12] Streamline global scientific and academic cooperation. Address technical issues concerning system incompatibility, access, and security. Programs enhance knowledge sharing, training, and access to e-infrastructure.

[13] Ten countries (Canada, Denmark, Estonia, Israel, Korea, Mexico, Uruguay, New Zealand, Portugal, and United Kingdom) and started in 2014. It aims to develop connectivity, open government, and open standards, to guarantee digital rights and support to all citizens to access digital services.

[14] Colombia supported online government programs in the Dominican Republic and Guatemala.

Table A. 4. Digital Supporting Environment Areas and Metrics

Area	Topic	Foreign	Domestic/ regional	Metric	Source
Infrastructure [109] [29] [72]	Digital literacy	X [92]	X	Individuals using internet	[48] [30]
	Internet availability	X	X	4G mobile population coverage	[51]
	Internet affordability		X	Mobile broadband prices; share of average monthly income	[1]
	Device affordability		X	Price of cheapest smartphone	[2]
	Connection quality/speed	X	X	Internet speed	[76]
	Competitive environment		X	Independent telecommunications	[31]
			X	Mobile and fixed retail providers	
	Data centers	X	X	Number of data centers	[21]
	Regulatory environment (governance, policy)	X	X	ITU ICT Regulatory Tracker Index	[49]
Financial services [109]	Population with FS account and digital FS account; bank account with online services		X	Global Findex Survey 2021 Global Findex database	[27] [110]
Digital businesses [109] [92]	Digital start-ups	X [92]	X	Country and city rank; number of start-ups and unicorns [92]	[85]
	Digital established businesses	X [92]	X [29]	Number of established businesses; digital transactions data; usage of robotic process automation/ AI/cloud and investors [92]	
	Structures to support digital businesses		X	Accelerators	
Digital skills [109] [29] [92] [72]	Digital skills development	X	X	Education/training programs	[71]
	Tertiary education/ educational attainment	X	X	Share of population by age group	
	Number of graduates from programs	X [92]	X		[99]
	Basic digital skills		X	Important for domestic demand	

	Intermediate (BP); advanced digital skills (IT)	X	X		

Area	Topic	Foreign	Domestic/ regional	Metric	Source
Trust environment [109] [92] [72]	Cross-border data flow regulations	X	X	OECD DSTRI Indicator 73	[31]
	Data protection law (exist/ comprehensive)	X	X		
	National cybersecurity policy/plan	X [92]		ITU Global Cybersecurity Index aggregate of five pillars and by area	[50]
	Enablers: e-commerce law; digital ID; open data policy; data portability rights [109]		X		
Overall	Strategy for digital services [29]	X	X		[4] [91] [81]
	Global benchmark ranks	X			

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About the project

The Georgetown Americas Institute's Latin America in the Global Economy (LAGE) program is a multiyear initiative to advance research and promote dialogue within the academy and with governments, the private sector, and civil society around the most critical economic challenges facing the region. A critical focus will be the emerging position of Latin America and the Caribbean (LAC) in a new global economic trade architecture characterized by deep structural changes.

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