



Digital Entrepreneurship and Innovation in Central America

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PREFACE



The COVID-19 pandemic has threatened to worsen the welfare of Central America. It is affecting employment, growth, trade, foreign direct investment, productivity, and the competitiveness of certain value chains. The digital ecosystem is more important than ever in Central America. Firms need to digitalize their operations and sales to adapt to the post-COVID situation and to reactivate economies. Businesses in the digital sector and high-tech manufacturing in Central America are more productive than the average firm. Small firms in Central America are just beginning to adopt technology, although there has been some progress recently due to COVID-19. Firms in the region see e-commerce, fintech, and robotics as especially transformative in their sectors over the next decade. However, firms also perceive challenges to adopting

technologies, such as lack of awareness about what technologies exist, uncertainties about the return on investment in technologies, and lack of access to finance and talent to acquire and use technologies. The region needs to adopt a regional e-commerce strategy and a digital business transformation strategy. The strategies should contain at least the promotion of a regional electronic commerce platform; promotion of regional access to finance for digital transformation and innovation of micro, small, and medium enterprises (MSMEs); improvement of trade procedures and regulations; promotion of low-cost electronic payment mechanisms; revision of specific regulations for the digital sector; and promotion of linkages between the supply of and demand for technology.

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ABBREVIATIONS

4G	Fourth Generation
5G	Fifth Generation
AI	Artificial Intelligence
B2B	Business-to-Business
B2C	Business-to-Consumer
B2G	Business-to-Government
BANDESAL	Development Bank of El Salvador
BPO	Business Process Outsourcing
CABEI	Central American Bank for Economic Integration
CATI	Computer-Assisted Telephone Interview
CDEs	Centers for MSME Enterprise Development
CENPROMYPE	Center for the Promotion of Micro, Small and Medium-sized Enterprises
CEO	Chief Executive Officer
COMIECO	Council of Ministers for Economic Integration
CONAMYPE	National Micro and Small Business Commission
FAT	Firm Adoption of Technology
FIAS	Facility for Investment Climate Advisory Services
ICT	Information and Communications Technology
IFC	International Finance Corporation
IHCIETI	Honduran Institute of Science, Technology and Innovation
IP	Internet Protocol
ISIC	International Standard Industrial Classification
IT	Information Technology
MEIC	Ministry of Economy, Investment and Trade
MIPYME	Micro, Small, and Medium Enterprises
MSMEs	Micro, Small, and Medium Enterprises
NGO	Non-Governmental Organization
PROCOMER	Costa Rican Trade Promotion Agency
PROPYME	Costa Rican Small and Medium Enterprise Support Program
SBDC	Small Business Development Center
SDE	Secretarial for Economic Development
SENPRENDE	Honduran National Service for Entrepreneurship and Small Business
SICA	Central American Integration System
SIECA	Secretariat for Central American Economic Integration
SMEs	Small and Medium Enterprises
SSFm	Seed-Stage Funding Mechanism
STEM	Science, Technology, Engineering, and Mathematics
USD	United States Dollars

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¹The FIAS partnership was established in 1985 to provide advice to governments on reforms needed to improve their investment climate. Today, the FIAS program is co-financed by the World Bank Group and nearly 20 development partners.

EXECUTIVE SUMMARY

COVID-19 has made the digital revolution more important than ever. In addition to creating a need to avoid physical contact, the pandemic is affecting employment, growth, trade, foreign direct investment, productivity, and the competitiveness of certain value chains. Despite initial reduction projections, remittances experienced positive growth in 2020–2021. Firms need to digitalize their operations and sales to adapt to the post-pandemic situation and to reactivate economies. It is necessary to digitalize sales, marketing, and production processes to transform the supply chain and be competitive. Many individual entrepreneurs and services firms can offer their services via the Internet, transforming themselves into regional or global service providers. Digitalization is changing how business is done, opening opportunities for entrepreneurs—including women entrepreneurs—to enter global value chains (Rajahonka and Villman 2019). The digital revolution is crucial for innovations to reduce physical contact, improve access to regional and international markets, and increase investments.

A strong entrepreneurial ecosystem is essential for digital revolution. Growing businesses—especially small businesses—cannot “go digital” on their own. They depend on supporting services for their success and finding sufficient demand. These supporting services include laws and regulations, technology infrastructure, vendors of technology products and services, networking opportunities, access to finance for every business phase, nearby agglomerations of businesses in the same sector, public programs, intermediary organizations, human capital, and access to markets.

This report assesses entrepreneurship ecosystems in Central America and provides a series of recommendations. The International Finance Corporation (IFC), under the Digital Innovation & Entrepreneurship in Central America project carried out the assessment at the request of CENPROMYPE. The assessment was carried out in four countries of Central America—Costa Rica, El Salvador, Guatemala, and Honduras—and combined a set of analytical instruments. It included an analysis of firm-level micro-data, an analysis of public programs and intermediary organizations to support entrepreneurship, focus groups, and an online survey of more than 2,000 firms on technology use.

The assessment confirmed that businesses in the digital sector and high-tech manufacturing are more productive than others. Yet, such firms face many challenges. The findings and the corresponding recommendations also cover challenges that make it difficult for small and medium enterprises (SMEs) to digitalize their operations and for start-ups in general. Table 1 below covers subjects as diverse as productivity, public programs, intermediary organizations, need for training and support to transform and adapt operations to e-commerce, need to increase access to finance, need to improve business environment and regulations and move forward on e-government, and need to consider public policies to support the tech industry.

Table 1.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

Findings/challenges	Recommendations	Suggested responsible agencies and timeframe
<p>Small firms in Central America are just beginning to adopt technology—most are still using manual methods and basic digital tools to manage operations, sales, payments, marketing, and decision-making processes.</p>	<p>Approve and adopt a regional e-commerce strategy and a digital business transformation strategy and supporting programs to encourage technology adoption for SMEs. (The contents of the strategies are described below with the relevant findings.)</p>	<p>CENPROMYPE and the Council of Ministers for Economic Integration (COMIECO). Approval—Short term Adoption—Medium term</p>
<p>There is substantial heterogeneity of local ecosystems. Public programs and intermediary organizations are providing business development services without a clear orientation toward high-potential ecosystems.</p>	<p>Promote coordination among government, supporting organizations, and donors to define priorities across local ecosystems and identify critical gaps to support start-ups, especially digital start-ups.</p> <p>Reorient existing programs to the needs of local ecosystems. For example, restructure programs to support early-stage business and to create more linkages between supply of and demand for technology.</p> <p>Create technology centers in coordination with incubators/accelerators to offer extension services and laboratories for testing and prototyping in geographic areas where there are high-potential entrepreneurship ecosystems.</p>	<p>Ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies. Short term</p> <p>Ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies, in coordination with incubators/accelerators. Medium term</p>
<p>Lack of awareness about what technologies exist to digitalize.</p>	<p>Provide technical assistance to SMEs on technologies available through business associations and small business development centers (SBDCs)</p>	<p>CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies through business associations and SBDCs. Short term</p>
<p>There are limited links between the supply of and demand for digital products and services.</p>	<p>Use the digital business transformation strategy and marketplace platforms as the first steps toward encouraging governments, accelerators, universities, and business associations to promote linkages between digital service providers and national, regional, and international industries.</p>	<p>CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies through business associations and SBDCs. Medium term</p>

Findings/challenges	Recommendations	Suggested responsible agencies and timeframe
<p>Firms of all sizes across the region perceive a need for support and training on using digital technologies.</p>	<p>Provide technical assistance programs to help SMEs digitalize their operations. Provide transformation awards for Central American firms that have translated technologies into growth to motivate more firms to test new technologies.</p>	<p>CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies through business associations, SBDCs, universities, and business schools.</p> <p>Medium term</p>
<p>Access to finance is one of the main constraints on companies with respect to digitalization. Access to finance in general is still an underserved area in most countries of Central America. Many of the options for formal access to finance require that companies have been operating for a long time and have assets to back up their loans. Financial institutions' lack of appetite for financing small businesses drives entrepreneurs to pawnshops and very informal non-regulated financial entities that provide extremely expensive credit.</p> <p>Most digital start-ups need capital rather than debt to grow, but the market for seed, venture, and private equity funds in Central America is underdeveloped. The ecosystem value of technology-based start-ups in Central America is estimated to be USD 319 million (USD 71 million raised), about 0.14 percent of the value of the Latin American and Caribbean total ecosystem of USD 221 billion. However, only 15 percent of innovators seeking equity find investors in the first 12 months.</p> <p>Incubators/accelerators primarily focus on managerial training and capacity building for businesses in the early stages, but just a few offer access to finance.</p>	<p>Establish regional facilities for digital transformation and create a differentiated credit policy for SMEs. Countries could also create digital transformation facilities that leverage existing government SME and technology funds and co-finance viable digital transformation projects with the target firms, private lenders, and investors. The digital business transformation strategy should include promoting regional access to finance for digital transformation and innovation of micro, small, and medium enterprises (MSMEs).</p> <p>For tech companies, it is vital to support facilities for incubators/accelerators, such as IFC Startup Catalyst, a facility through which to invest in a portfolio of seed-stage funding mechanisms (SSFMs) through equity and quasi-equity instruments. These SSFMs, in turn, support entrepreneurs and their early-stage companies across IFC's target markets.</p> <p>The regulatory framework in most countries needs to be modified and regionally harmonized to foster financial innovation and access to finance, including protection for minority investors. It is important to create regulatory conditions that would allow for early-stage financing through venture capital and crowdfunding.</p>	<p>Central American Bank for Economic Integration (CABEI) with support from IFC.</p> <p>Short term</p> <p>IFC.</p> <p>Short term</p> <p>Financial system regulators.</p> <p>Medium term</p>

Table 1.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

Findings/challenges	Recommendations	Suggested responsible agencies and timeframe
<p>The business environment, including the regulatory framework, is one of the main challenges for using digital services in Central America and for digital business development. Business registration, taxes, access to finance, intellectual property protection, ride-sharing, data protection, consumer protection, cybersecurity, and regulations that have not adapted to the countries' needs are the main challenges for using digital services in Central America.</p>	<p>Create regional and national programs to improve the business environment and regulatory framework using e-government services and an observatory of good practices. Revise outdated laws and regulations, including tax regulations, that are obstacles to e-commerce. Include in the regional e-commerce strategy the revision of regulations for the digital sector, including e-commerce, banking laws, fintech, e-payments, ride-sharing legislation, commercial codes for the protection of minorities, cybersecurity, data protection, digital consumer protection, competition policies, and intellectual property laws.</p>	<p>COMIECO/Secretariat for Central American Economic Integration (SIECA), ministries of economy/trade, and innovation agencies.</p>
<p>There are many customs and logistical hurdles to importing and exporting products purchased online, including high commissions for electronic payments.</p>	<p>The regional e-commerce strategy should include improving the enabling environment (that is, procedures and regulations for trade logistics, such as expedited shipments) and allowing for low-cost electronic payment mechanisms across borders.</p>	
<p>Entrepreneurs mention insufficient e-government and customer services as challenges.</p>	<p>Improve e-government services. First, reduce unnecessary formalities and documents and promote Gov Tech entrepreneurial solutions to improve central and municipal government services</p> <p>Create mutual recognition of IDs to facilitate opening bank accounts and business, promote data transfer to facilitate migration while personal data is protected.</p>	<p>e-government agencies and all government institutions. Medium term</p>
<p>Digital service providers have limited access to markets. To penetrate international markets, midsize and large companies turn to business associations and export promotion agencies.</p>	<p>Export promotion agencies in the region and embassies abroad can play a useful further role in promoting digital service providers in world markets and with large buyers</p>	<p>Export promotion agencies. Medium term</p>

Findings/challenges	Recommendations	Suggested responsible agencies and timeframe
<p>Digital service providers and other firms face challenges in recruiting relevant talent.</p>	<p>Update the education and vocational curricula to meet the needs of the digital industry and promote academy-industry partnerships. It is important to facilitate the learning of coding skills in schools and universities for both men and women.</p>	<p>Ministries of education together with innovation agencies, ministries of economy, universities, and business schools.</p> <p>Medium term</p>
<p>Fewer women own businesses in the digital sector.</p>	<p>Increase the participation of women in training programs for SMEs and potential digital start-ups, supporting digital skills development.</p>	<p>CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies.</p> <p>Short term</p>
<p>Public policy does not favor the Central American technology Industry. There are no dynamic models that allow innovation and provide accompaniment, financial support, and technology transfer so that companies can reach a point where they can access credit and support to move forward with autonomy.</p>	<p>Consider formulating public policy to support innovation in the technology industry. As a first step, promote the adoption of standardized monitoring and evaluation systems for entrepreneurship programs. Make firm-level data more widely available with comparable indicators of entrepreneurship at the national and sub-national levels</p>	<p>Ministries of economy and innovation agencies.</p> <p>Medium term</p>



01.

INTRODUCTION

The digital ecosystem is more important than ever, not least because firms need to digitalize their operations and sales to adapt to the post-COVID situation and reactivate economies.

It is necessary to digitalize sales, marketing, and production processes to transform the supply chain and be competitive.

Central American countries, in general, have a relatively low entry rate of firms and low innovation and technological upgrading.

In Guatemala, El Salvador, and Honduras, less than 2 percent of formal businesses are three years old or younger. Colombia (8 percent) and Mexico (9 percent) have higher proportions of young firms. In Costa Rica, 40 percent of formal firms report having introduced innovations in their production processes; however, only 14 percent of formal firms in El Salvador report having done so. Less than 7 percent of manufacturing exports in Honduras, Guatemala, and El Salvador are considered high tech, but 18.5 percent of Costa Rican manufacturing exports are considered high tech.

Digital technologies can play a crucial role in transforming SMEs, especially those most affected by the crisis.

Digital innovations are essential to reducing physical contact, improving access to regional and international markets, and increasing investments. Strengthening the technology sector and, especially, opening opportunities for entrepreneurs and MSMEs to use digital technology to better their innovation and competitiveness is vital for the region. It would open opportunities to develop new value

chains, diversify products, reduce time to market, and create jobs. Technology-based start-ups can be at the center of these dynamic trends in productivity and competitiveness. The promotion of digital technologies in the transformation of entrepreneurs and SMEs may also create opportunities for investments through financial institutions.

The COVID-19 pandemic has jeopardized Central Americans' livelihoods and welfare.

The crisis is affecting the region's employment, economic growth, trade, foreign direct investment, productivity, and the competitiveness of certain value chains. The average unemployment rate in Latin America and the Caribbean, which was 8.1 percent at the end of 2019, could rise between 4 and 5 percentage points. The severe contraction in the United States in the second quarter of 2020 has affected Central America through trade. Central America's economy shrank an estimated 6.1 percent in 2020 (World Bank Group 2021). Sectors such as textiles, manufacturing, tourism, and agriculture are most affected.

At this crucial time, the objective of this report is to assess the entrepreneurship ecosystems for digital innovation in Central America and provide a series of recommendations to strengthen them, focused on innovative digital providers and the digitalization of MSMEs.

At the request of CENPROMYPE, a specialized agency from the Central American Integration System (SICA), IFC, with the support of FIAS, prepared the Digital Innovation & Entrepreneurship in Central America project.

This project aims to strengthen the ecosystem of technology-enabled start-ups and MSMEs by improving the strategy and tools available to them and the policy and regulatory framework to promote digital entrepreneurship and innovation in Central America, particularly for youth, women, and strategic sectors. The program has two phases: (1) assessment and strategy of the entrepreneurship ecosystem to support technology-enabled start-ups and SMEs that innovate within their businesses using disruptive technologies and (2) strengthening the digital ecosystem and support for technology-enabled start-ups and SMEs.

An emerging tech start-up ecosystem in Central America, which the IFC project aims at boosting, could generate opportunities for angel investors, seed funding, and venture capital funds.

IFC and other stakeholders can catalyze efforts to escalate Central America's digital start-up ecosystems following best practices such as those used in Buenos Aires, Tel Aviv, Boston, and Silicon Valley.

These regions have succeeded in promoting networks among investors and entrepreneurs, developing targeted financial instruments, improving the regulatory framework to expand markets, and linking businesses to science, technology, engineering, and mathematics (STEM) education and digital skills programs (Senor and Singer 2009; World Bank 2018).

Besides the executive summary and this introduction, the document consists of five sections. Section 2, Methodology and Conceptual Framework, and section 3, Entrepreneurship Ecosystems in Central America, borrow heavily from a preliminary document prepared under the same program by Marcio Cruz and Jesica Torres with key inputs from Gabriela Montenegro. Section 4, Public Programs and Intermediary Organizations in Central America, has been summarized from the country reports drafted with the support of Gabriela Montenegro. This section describes public programs and intermediary organizations supporting entrepreneurship in four countries. Section 5, Adoption of Technology, contains a summary of the findings and recommendations from focus groups with private sector representatives and a survey of more than 2,000 firms conducted by Kati Suominen from Nextrade Group. Section 6 provides policy recommendations. The document contains annexes with the names of all stakeholders that have contributed to this document, detailed results from a survey of industries demanding technology, and detailed results from a survey of digital service providers.

Finally, it is important to mention that there are accompanying national reports. This document contains a summary of the team's work in four countries of Central America: Costa Rica, El Salvador, Guatemala, and Honduras. The section on the adoption of technology and recommendations also includes findings for Nicaragua and Panama, countries included in a survey of more than 2,000 firms. Besides this regional report, there are four other reports, one each for Costa Rica, El Salvador, Guatemala, and Honduras.



02.

METHODOLOGY AND CONCEPTUAL FRAMEWORK²

²Most of this section contains extracts from a draft document "Local Entrepreneurship Ecosystems in Central America: Challenges and Opportunities of Digital Technologies" (Cruz and Torres 2020), which was prepared by Marcio Cruz and Jesica Torres with key inputs from Gabriela Montenegro under the IFC Digital Entrepreneurship & Innovation program, led by Mayra Alfaro de Moran and Pedro Andres Amo.

This evaluation of entrepreneurship ecosystems in Central America uses multiple methods. Following the approach proposed by the World Bank (2019),³ it combines an analysis of firm-level micro-data, data collected from quantitative analysis of programs to support entrepreneurship, findings from focus groups, and the results of a survey of more than 2,000 firms on technology use.

The assessment of the digital entrepreneurship ecosystems in Central America to devise metrics that help guide policy interventions consists of a context analysis and an analysis

of entrepreneurship support programs. The context analysis provides a snapshot of the entrepreneurship ecosystem, examines outcomes (entry, scale-up, technology adoption) and pillars (supply factors, demand factors, and barriers), and identifies geographical agglomerations of businesses with the potential for additional growth (Figure 1). The support program analysis identifies gaps in the entrepreneurship support programs offered by the central government and intermediary organizations such as incubators and accelerators. Audretsch, Cruz, and Torres (2020) provide the analytical framework for the assessment.

Figure 1.

PILLARS AND THE PERFORMANCE OF THE ENTREPRENEURSHIP ECOSYSTEM

ENTREPRENEURSHIP ECOSYSTEM



Source: Cruz, Torres, and Tran 2020.

Dynamic entrepreneurship ecosystems require entrepreneurial talent, access to knowledge, skilled labor, a suitable physical infrastructure, and enablers that facilitate the optimal flow of resources from input markets into firms.

Entrepreneurs access resources in input markets (physical capital, intermediate goods, human capital, and knowledge), combine these resources, applying their talents to the production process, and sell the final goods or services in output markets. This

production process takes place in an ecosystem—a geographical location (municipality, state, country) characterized by the quality of entrepreneurship pillars and entrepreneurship outcomes (Cruz, Torres, and Tran 2020). A highly dynamic private sector where entrepreneurs easily enter and exit, profitable business opportunities scale up, and firms consistently upgrade their technological infrastructure (see Figure 1) requires (1) strong managerial capabilities, an appetite for risk, and access to markets (demand factors); (2)

³The overall methodology of assessing entrepreneurship ecosystems used in this study was designed and piloted by the World Bank under the “New Measures of Entrepreneurship” project, supported by the Korea–World Bank Partnership Facility (KWPF).

the availability of high-quality factors of production (supply factors); and (3) the removal of barriers that distort the flow of resources from input markets into firms, such as restrictions in access to finance, burdensome regulations, and cultural barriers to entrepreneurship (for example, fear of failure).

The context analysis in Central America evaluates the aggregate performance of the entrepreneurship landscape relative to regional peers and identifies local entrepreneurship ecosystems in strategic industries. The analysis first compares measures of business creation, scale-up of firms, and adoption of technology to other regional peers and documents gaps in the pillars of entrepreneurship using aggregate indicators of supply factors, demand factors, and barriers. The analysis then identifies geographical agglomerations of businesses within strategic industries or value chains and measures their potential using a variety of proxies for business creation, business scale-up, and innovation.

The algorithm to identify local entrepreneurship ecosystems evaluates the diversity of geographical agglomerations of businesses and their potential for additional growth. The method for identifying entrepreneurship ecosystems focuses on critical industries or value chains and identifies agglomerations within industries across subsectors and quality indicators (Cruz, Torres, and Tran 2020). To measure diversity, the algorithm first looks for statistically significant agglomerations of municipalities with a high density of establishments within each 4-digit subsector in the industry. It then counts the number of subsectors for which a municipality is part of an agglomeration.⁴ The algorithm then sorts the indicator into three broader measures of diversity: no agglomerations, agglomerations in one subsector, and agglomerations in more than one subsector. Similarly, to measure potential or quality, the algorithm first looks for agglomerations of municipalities in measures of business dynamism and the potential for additional growth within an industry. The algorithm then counts the number of quality indicators for which a municipality is part of an agglomeration and sorts them into three broader measures of quality: no quality agglomerations, agglomerations in one quality indicator, and agglomerations in more than one quality indicator. The algorithm uses the quality indicator

as a proxy for the potential of each ecosystem. High-potential ecosystems exhibit agglomerations in more than one quality indicator, maturing ecosystems exhibit agglomerations in one quality indicator, and incipient ecosystems exhibit no quality agglomerations. Finally, the algorithm combines the 3×3 broad indicators of diversity and quality into a typology with nine categories (Cruz, Torres, and Tran 2020).

In this case, the firm-level data obtained is not directly comparable across countries but is rich enough to offer novel quantitative results. The three databases presumably cover different segments of the business size distribution. Nonetheless, it is rich enough to allow the identification of local ecosystems and offer novel quantitative results. The records include the 4-digit International Standard Industrial Classification (ISIC) identifier for the economic activity, the locality where the business operates—a municipality in Honduras, Guatemala, and El Salvador—and the age of the business (the date when it first registered with the administrative authority).

The analysis of the mix of mechanisms to support entrepreneurship tries to identify gaps in public programs and intermediary organizations. The assessment provides a snapshot of the main programs that support entrepreneurship. The diagnosis collects data from public programs and intermediary organizations such as incubators, accelerators, and financial institutions using survey instruments developed specifically for this purpose. These surveys collect data such as the services provided by the public program or intermediary organization, the mechanism of intervention (for example, matching grant, credit guarantee, or technology extension service), the expected outcomes (entry, survival, or scale-up), and the target beneficiaries. The data also include the budget allocation and the number of beneficiaries across regions.

In addition, following the same pillars for the entrepreneurial ecosystem, the team conducted four national workshops (in Costa Rica, El Salvador, Guatemala, and Honduras) and a regional one with key Central American actors. The purpose of these workshops was to learn more about the supply and demand factors as well as barriers that affect the ecosystem, especially those related to

⁴Following Felkner and Townsend (2011), the measure of statistical significance is Moran's I. A subsector in the algorithm is a 4-digit ISIC subsector.



the digital sectors. The team also learned about the functionality of the ecosystem and its support for the development and adoption of digital technologies for growth, productivity, and job creation. Participants provided many interesting recommendations, which are incorporated in section 6.

Finally, to get a better understanding of technology demand and supply, IFC⁵ conducted two online surveys of more than 2,000 firms from 28 October 2020 to 25 January 2021 in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. The first survey focused on the use of technologies, bringing together 1,906 responses from the light manufacturing, business process outsourcing (BPO), agribusiness, and financial services sectors. The survey was inspired by and borrowed several questions from the Firm Adoption of Technology (FAT) survey, designed by Cirera, Comin, and Cruz (2020) and described by Cirera, Comin, Cruz, and Lee (2020). The second survey focused on the providers of digital services, totaling 209 firms across digital services sectors. These surveys seek to enable policymakers in the target countries, regional organizations, and the IFC to rigorously assess the types of technologies that firms in the region's growth sectors are adopting and the technologies that digital entrepreneurs are developing locally.

The surveys leveraged online survey methods and an online survey firm's proprietary panel of

respondents. The online survey process differs from a traditional survey process in which the researcher draws up a sample frame of firms in a country and then randomly selects firms from it for what are typically phone interviews. The online survey method is scalable and is considerably more cost-effective than a phone or computer-assisted telephone interview (CATI). Prior attempts at combinations of CATIs based on a sample frame and scalable online surveys have resulted in strikingly similar patterns in firms' performance between the two sets (when comparing firms of the same size, sector, and geography). The method also allowed more easily reaching firms that were not at their physical offices and by their phones due to COVID-19.

There are some tradeoffs between online and traditional sampling methods. Online surveys inherently capture firms that are, at least to an extent, digitized so they can take the survey online and have self-selected to take a survey about the use of technology (thus likely going in knowing something about technology use). Hence, the sample, to an extent, over-represents firms that are more technology-intensive (and export-oriented, larger, and better performing). However, from experience, this does not markedly alter the general patterns of firm performance and technology adoption from what they are in a CATI survey drawn from a sampling frame.

⁵IFC hired Next Trade Group to carry out the surveys and prepare the analysis, which provided many important findings and recommendations, most of which are included in this document.

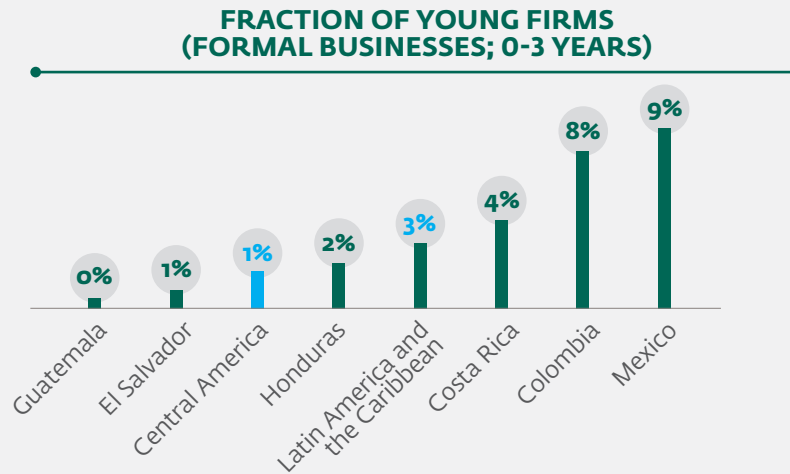


03. □

ENTREPRENEURSHIP ECOSYSTEMS IN CENTRAL AMERICA

Weak dynamism, limited capabilities to scale up, and significant lags in technology adoption characterize entrepreneurship in Guatemala, Honduras, and El Salvador. Central America exhibits comparatively weak rates of business creation. In Guatemala and El Salvador, less than 1 percent of formal businesses are 3 years or less, and this fraction is only 1.8 percent in Honduras (Figure 2). In Costa Rica, this fraction is more than double that in Honduras, but still a bit far from Colombia (8 percent) or Mexico (9 percent).

Figure 2.



Source: World Bank Enterprise Survey (own calculations).

Central America, except for Costa Rica, also exhibits limited capabilities for business scale-up. Formal businesses in Honduras, Guatemala, and El Salvador increase their number of employees at rates lower than 3 percent per year on average, whereas businesses in Costa Rica, Mexico, and Colombia grow at rates that exceed 4 percent (Figure 3). Formal businesses that survive at least 20 years are significantly smaller in Honduras, Guatemala, and El Salvador relative to their regional peers (Figure 4). For example, formal firms in Guatemala employ only 27 workers after at least 20 years, much lower than the average of 55 in Costa Rica and 73 in Mexico.

Figure 3.

ANNUAL EMPLOYMENT GROWTH FOR FORMAL FIRMS

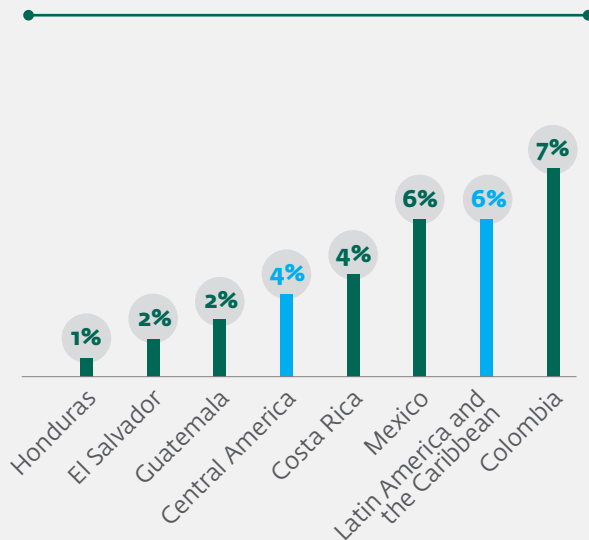
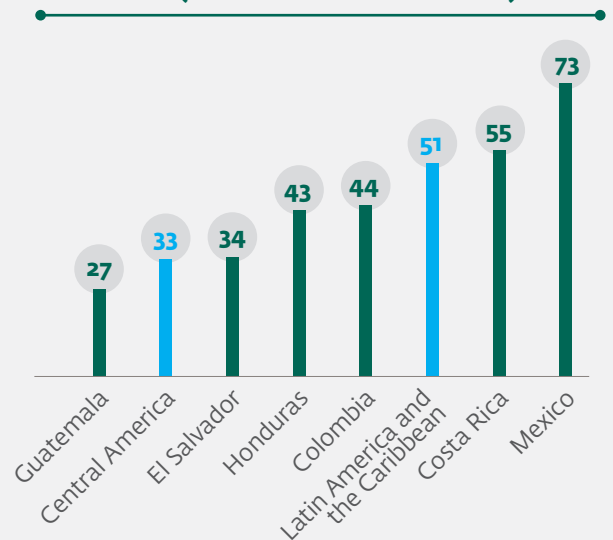


Figure 4.

AVERAGE SIZE OF FORMAL FIRMS 20+ YEARS OLD (NUMBER OF WORKERS)

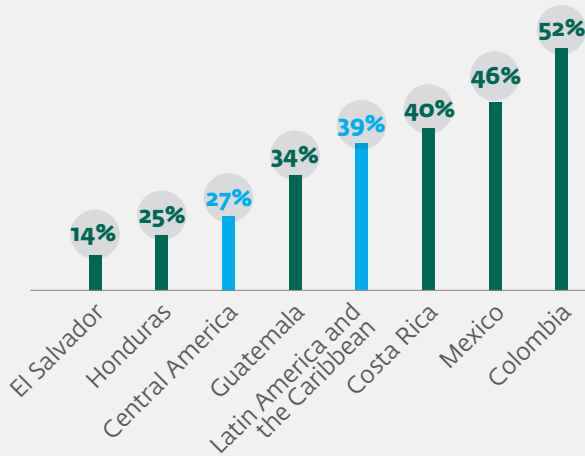


Source: World Bank Enterprise Survey (own calculations).

The private sector in Costa Rica shows significant innovation and R&D, contrary to its neighbors Honduras, Guatemala, and El Salvador. In Costa Rica, 40 percent of formal firms report having introduced innovations in their production process (Figure 5). However, only 14 percent of formal firms in El Salvador report doing so. Less than 7 percent of manufacturing exports in Honduras, Guatemala, and El Salvador are considered high tech (Figure 6), but Costa Rica’s manufacturing exports double this figure (18.5 percent). Less than 12 percent of businesses in Central America spend on R&D (Figure 7), a third of the fraction spent in Costa Rica (37 percent).

Figure 5.

BUSINESSES THAT HAVE INTRODUCED INNOVATIONS IN PRODUCTION



Source: World Bank Enterprise Survey (own calculations).

Figure 6.

HIGH-TECH EXPORTS (AS A PERCENTAGE OF MANUFACTURING EXPORTS)

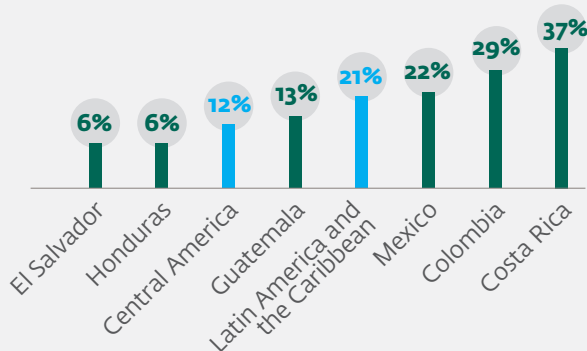


Source: World Development Indicators.

Note: High-tech exports are products with a high element of R&D such as the aerospace industry, computers, pharmaceuticals, and electric equipment.

Figure 7.

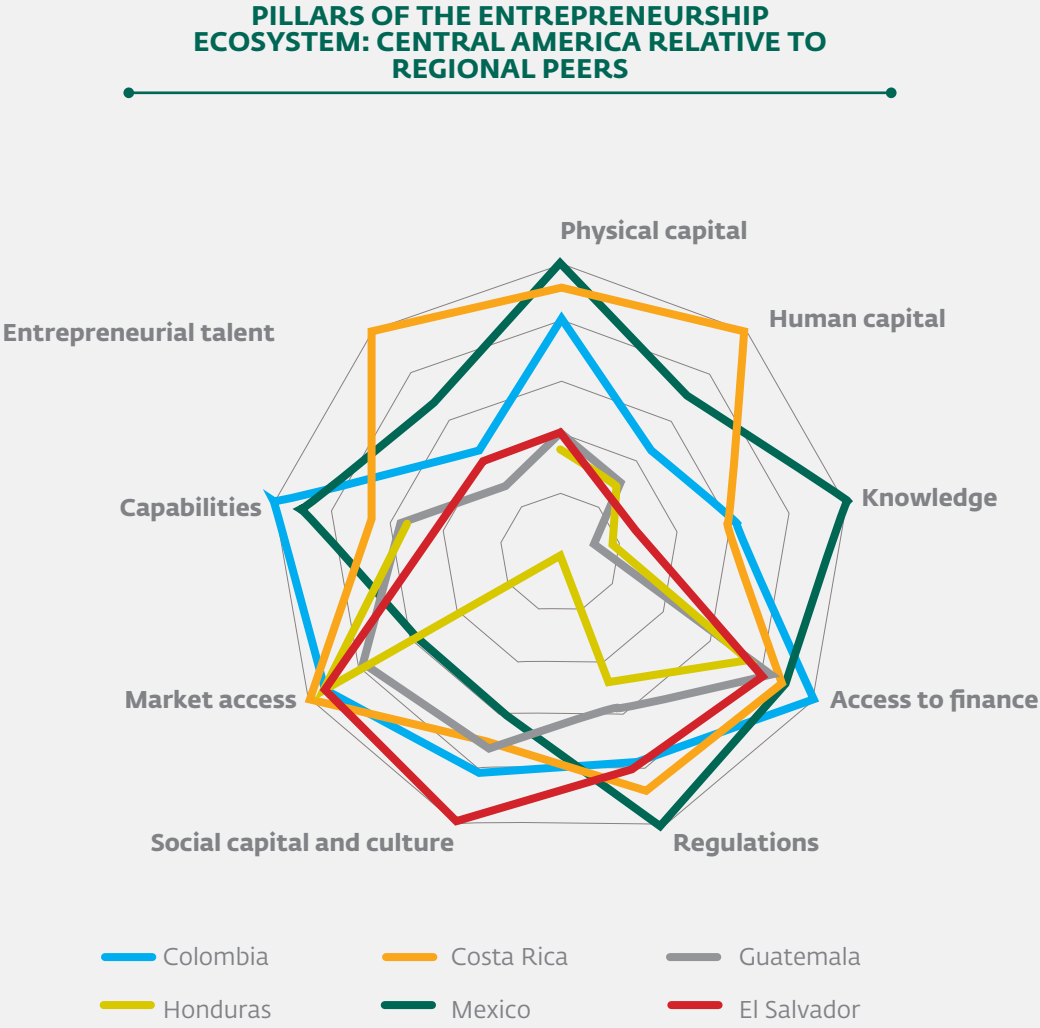
BUSINESSES THAT SPEND ON R&D



Source: World Bank Enterprise Survey (own calculations).

Guatemala, Honduras, and El Salvador also exhibit significant lags in the pillars of the entrepreneurship ecosystem. Gaps in the pillars of the entrepreneurship ecosystem in Guatemala, Honduras, and El Salvador relative to regional peers mirror the performance of the region in entrepreneurship outcomes (Figure 8). The availability of production factors—such as physical capital, human capital, and knowledge—plays a critical role in an innovative entrepreneurship ecosystem. However, relative to their regional peers, Honduras and Guatemala produce with markedly less capital per worker. Moreover, only around 5 percent of the population ages 25 or more in Guatemala, Honduras, and El Salvador have completed a tertiary degree, while in Costa Rica this fraction is more than 20 percent (Figure 9). Less than 25 percent of these degrees are in science and engineering (Figure 10).

Figure 8.



Source: Own calculations combining different indicators from World Bank Enterprise Survey; Entrepreneurship Survey and Database; International Comparison Program; World Development Indicators; Penn World Table 9.1; Global Innovation Index; Doing Business Indicators; and Global Entrepreneurship Monitor.

Note: The figure shows average performance in indicators of supply factors (physical capital, human capital, and knowledge), demand factors (entrepreneurial talent, firm capabilities, and market access), and barriers (access to finance, regulations, and culture) for Central America and regional peers. The raw indicators are converted into a scale of 0-100, where 100 is assigned to the best performing country. In this chart, lines toward the outside indicate that a country is performing relatively well on the nearest indicator, whereas lines toward the middle indicate that a country is performing relatively poorly on the nearest indicator.

Financial barriers to the flow of resources into firms are binding constraints in Central America.

The average interest rate on bank loans in Honduras (19.26) is more than twice the average rate in Mexico (7.34). The problem is not merely that the average interest rate on bank loans is high; financial institutions, moreover, do not have the appetite for financing small businesses and entrepreneurs. Only around 40 percent of formal firms in Guatemala, Honduras, and El Salvador have access to loans or credit lines with the banking sector, whereas this fraction exceeds 60 percent in Colombia. Consequently, entrepreneurs in Central America get loans with pawnshops or non-regulated financial entities, some of them very informal, that tend to provide extremely expensive credit to individuals and SMEs. These costly loans combined with a lack of skills to manage a business (including inadequate financial knowledge) are important reasons why many entrepreneurships are unsuccessful.

Regulatory barriers also hamper entrepreneurship in many countries. Starting a formal business in Honduras takes, on average, more than 40 days. In El Salvador, registering a property takes, on average, at least 30 days. It only takes around 10 days in Costa Rica, though.

Demand pillars such as managerial and entrepreneurial capabilities, combined with access to national and international markets, are key. Yet, gaps in these fundamentals of the entrepreneurship ecosystem in the region mirror gaps in the supply pillars and the barriers. Only around 5 percent of

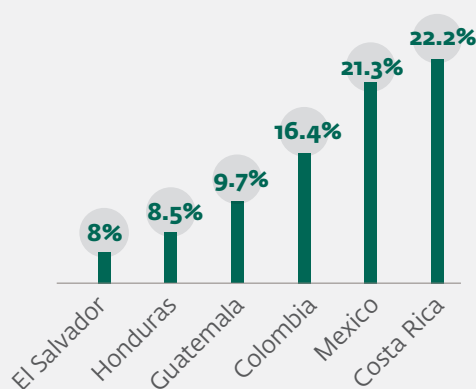
formal businesses in El Salvador have earned an international quality certification. In Costa Rica, there are almost 3.5 opportunity entrepreneurs for each entrepreneur out of necessity; this ratio is around 1 in Guatemala and El Salvador.

Orienting policy interventions to target specific sectors and specific regions could accelerate convergence. Improving structural factors such as human capital and access to finance, while critical for growth in the long term, is a gradual process, whereas investments in local entrepreneurship ecosystems could accelerate convergence and lead to higher gains in productivity. Thus, it is critical to identify the areas with higher potential for entrepreneurship to provide focal interventions that address challenges that are sector- and region-specific.

Sections 3.1 to 3.5 present an analysis of the entrepreneurship ecosystem in Central America based on a rich database compiled from anonymized administrative records. In El Salvador, these records cover mainly large formal businesses as measured in workers per business, sales per business, or assets per business. The database for Guatemala is more comprehensive, with almost 1.7 million businesses, whereas the database for Honduras covers relatively fewer and smaller firms. The data made available to the team regarding Costa Rica does not contain variables that would help measure the potential of ecosystems; for this reason, Costa Rica is not included in these sections.

Figure 9.

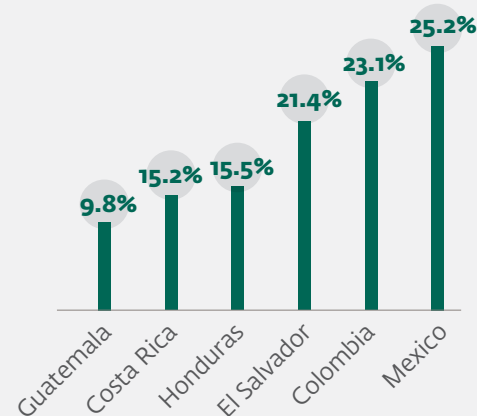
POPULATION 25+ WITH TERTIARY EDUCATION



Source: World Development Indicators.

Figure 10.

GRADUATES IN SCIENCE AND ENGINEERING (OF THE TOTAL NUMBER OF GRADUATES FROM TERTIARY EDUCATION)



Source: Global Innovation Index.

3.1. LOCAL ENTREPRENEURSHIP ECOSYSTEMS

The analysis of spatial correlations in economic activity in Honduras, Guatemala, and El Salvador exploits anonymized records from administrative databases from ministries of economy and tax authorities. (See Table 2.) The data is not directly comparable across countries but is rich enough to offer novel quantitative results. The three databases presumably cover different segments of the business size distribution. For example, whereas the average number of employees per business in the data for Honduras is 4.6, the average size in the data for El Salvador is 29.2. Similarly, sales per business in the data are around USD 21,000 for Honduras, USD 53,000 in Guatemala, and USD 1.7 million in El Salvador. Nonetheless, the data is rich enough to allow the identification of local ecosystems and offer novel quantitative results. The records include the 4-digit ISIC identifier for the economic activity, the locality where the business operates—a municipality in Honduras, Guatemala, and El Salvador—and the age of the business (the date when it was first registered with the administrative authority).

Table 2.

CHARACTERISTICS OF THE DATABASES ANALYZED TO IDENTIFY LOCAL ECOSYSTEMS IN CENTRAL AMERICA

	Honduras	Guatemala	El Salvador
Agency Source	SENPRENDE	SAT	DIGESTYC (Ministry of Economy)
Year	2018	2018	2014–18
Number of businesses	4,415	1,673,477	23,057
Average size (number of workers)	4.6	NA	29.2
Average wage ^a	NA	4,000	NA
Sales per business	20,914	52,876	1,703,700
Assets per business	NA	119,652	2,676,700
Profits per business	1,298	NA	NA

Note: a. Yearly figures in USD. In Guatemala and Honduras, the figures use the exchange rate for January 31 of 2020.

The firm-level data in Honduras, Guatemala, and El Salvador contains sales records and other variables that proxy for the productivity of the business and help measure the potential of geographical ecosystems. The algorithm to measure the potential of entrepreneurship ecosystems exploits indicators of business dynamism and potential for additional growth. For Honduras, these indicators are the number of young businesses in the municipality (0–4 years), the average sales per business, the average number of workers per business, and the average sales per worker. In Guatemala, the quality indicators are the number of young firms (0–4 years), the average sales per business, the average assets per business, and the average wage bill per business. For El Salvador, the indicators of

potential are the number of young firms (0–3 years), the average number of workers per business, the average assets per business, and the average sales per worker.

The analysis of local ecosystems considers industries that are strategic in terms of their potential in boosting productivity growth and that represent a significant fraction of employment in Central America. The algorithm to identify entrepreneurship ecosystems identifies spatial agglomerations within an industry or value chain. In Central America, the analysis centers on strategic industries: the digital sector and high-tech manufacturing; tradable services such as tourism, financial services, and BPO; and traditional industries such as agribusiness and light manufacturing.⁶

⁶ The digital sector includes manufacturing and repair of computers and telecommunications equipment, retail and wholesale of computers, programming activities, publishing and broadcasting activities, and data processing (Barefoot et al. 2018). High-tech manufacturing is the industry responsible for producing technology products with a high element of R&D, such as aerospace products, chemicals, plastics, pharmaceuticals, electrical equipment, electronics, motors, and medical and optical instruments (Wolf and Terrell 2016). Tourism includes accommodation services, entertainment activities, food preparation services, and air transportation. Financial services combine financial activities, insurance, and pension services, and BPO includes call centers, management consulting, and administrative support activities. Agribusiness combines agriculture and food processing. Finally, light manufacturing includes textiles, apparel, leather, wood products, and metal products (Dinh et al. 2012 and Dinh 2014).

3.2. DIGITAL TECHNOLOGIES AND HIGH-TECH MANUFACTURING

Businesses in the digital sector and high-tech manufacturing in Central America are potentially more productive than the average firm. Businesses in digital technologies account for a relatively small share of observations (2 percent in Guatemala and 4 percent in Honduras and El Salvador). Still, the productivity of their labor is substantially larger than that of the average business. Sales per worker in El Salvador are 4.5 times the sales per worker in the average business, and in Guatemala, the average wage bill in digital businesses is 2.4 times the wage bill in the average business (Table 3). Similarly, high-tech manufacturing accounts for a small fraction of businesses in the region (2 percent in Honduras and El Salvador and only 0.5 percent in Guatemala), but the productivity of those firms is potentially large. Average sales per business in the industry are 2.5 times the sales of the average business in El Salvador and almost 9 times the sales of the average business in Guatemala.

Table 3.

CHARACTERISTICS OF BUSINESSES IN THE DATA IN THE DIGITAL SECTOR AND HIGH-TECH MANUFACTURING

Country	Industry	Fraction of firms	Sales per firm ^a	Fraction of employment	Sales per worker ^a	Fraction of women-owned firms
Guatemala ^b	Digital Sector	2%	1.8	5%	2.4	23%
	High-tech manufacturing	0%	8.7	4%	9.7	23%
Honduras	Digital Sector	4%	0.6	3%	1.0	47%
	High-tech manufacturing	2%	1.1	1%	0.5	55%
El Salvador	Digital Sector	4%	1.2	3%	4.5	27%
	High-tech manufacturing	2%	2.5	4%	0.8	33%

Note: a. Sales per firm and sales per worker are relative to the average plant in the data.

b. In Guatemala, the fraction of employment is the fraction of the total wage bill (because employment per plant is not available), and sales per worker corresponds to the relative wage bill.

In the data, fewer women own businesses in the digital sector and in high-tech manufacturing relative to other industries. In El Salvador, 27 percent of businesses in digital technologies are owned by women, compared to the average of 31 percent across industries in the data. In Guatemala, 23 percent of businesses in digital technologies and 23 percent of businesses in high-tech manufacturing are owned by women, compared to the average across industries of 37 percent in the data. Moreover, whereas women account for 35 percent of the employment in the data in El Salvador, the fraction of women employees in high-tech manufacturing is only 25 percent.

The digital sector in the region seems to exhibit more dynamism relative to businesses in other economic activities. The data for El Salvador contains identifiers that track the business over time and help examine the flows of formal businesses in and out of the economy. On average, 6.5 percent of formal digital businesses in El Salvador will exit, and 7.4 percent of digital businesses will enter in a given year (Figure 11). Moreover, digital enterprises exit at a faster rate relative to other industries (6.5 vs. 5.1), but they also enter at a relatively faster pace (7.4 vs. 6.1). Digital enterprises that survived between 2014 and 2018 in El Salvador became significantly more productive—sales per

hour worked in surviving digital businesses increased by 43 percent in the 5-year period (Figure 12), whereas productivity in surviving businesses in other industries seems to have remained relatively the same.

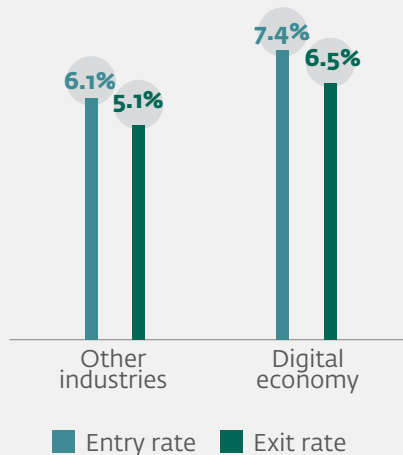
High-potential entrepreneurs in digital technologies mainly agglomerate in the capital cities of the region. The capitals of Guatemala and El Salvador exhibit significant densities of businesses in digital technologies. These high-potential agglomerations account for around 1 percent of businesses in Honduras and Guatemala and almost 4 percent of businesses in El Salvador. Most digital businesses in El Salvador operate in geographical agglomerations (93 percent of businesses in the industry), whereas in Honduras and Guatemala, close to a third of businesses in the data operate in locations without significant densities of businesses in the industry. Businesses in high-potential ecosystems in the data for El Salvador are significantly larger than digital businesses in Honduras and Guatemala—sales

per digital business high-potential ecosystems in El Salvador average USD 1.8 million per year, and only around 183,000 in Guatemala and 21,500 in Honduras. The region exhibits other digital agglomerations in the north of Guatemala, the west of Honduras, and San Miguel in El Salvador, but these agglomerations seem to be in the early stages of development.

Most production in high-tech manufacturing in the region seems to take place in geographical agglomerations. Santa Ana, La Libertad, San Salvador, and La Paz in El Salvador have maturing or high-potential entrepreneurship ecosystems in high-tech manufacturing. Similarly, several departments across Honduras seem to exhibit significant agglomerations in the industry, for example, Atlántida, Yoro, Comayagua, and Olancho. In Guatemala, only the department of Guatemala and the north of Escuintla exhibit agglomerations in both diversity and quality.

Figure 11.

**YEARLY RATE OF ENTRY AND EXIT
(AVERAGE FOR 2014–18)**



Source: Own calculation using DIGESTYC panel data.

Figure 12.

**SALES PER WORKER-HOUR
AMONG FIRMS SURVIVING 2014–18^a (USD)**



Source: Own calculations using DIGESTYC panel data.

Note: a. Sales per worker-hour are computed as sales per worker divided by 2,080 hours (assuming a typical work week of 40 hours). The analysis considers only surviving businesses between 2014 and 2018.



3.3. TRADABLE SERVICES: TOURISM, FINANCIAL SERVICES, AND BPO

Globally, for both firms in the services industry and individual entrepreneurs, digitalization largely takes three forms. One is the digitalization of knowledge-intensive business services such as financial services and business process outsourcing. The second is e-commerce, such as booking and paying for tourism services. The third is enabling new business models, including marketing via social media, online customer feedback, hyper-personalized services, self-service, the sharing economy, and virtual reality. All three have the potential to expand the markets and revenues of individual entrepreneurs and services firms. Evidence suggests that digital tourism, for example, has a positive effect on gross domestic product (e.g., Watkins et al. 2018).

Tourism accounts for a significant fraction of the employment in the data and employs a comparatively high fraction of women. Diversity and quality in tourism in the region is mainly agglomerated in the capital cities. Tourism accounts

for 7 percent of the employment in the data for El Salvador and 6 percent of the employment recorded for Honduras (see Table 4). The average fraction of women employed by the industry is high compared to the average—in El Salvador, 43 percent of the employees in the industry are women, whereas this fraction is 35 percent in the average business. High-potential ecosystems in tourism in the data account for around 2 percent of businesses in Honduras and 4 percent of businesses in Guatemala and El Salvador. These agglomerations are in the department of Guatemala in Guatemala; La Libertad, San Salvador, and San Miguel in El Salvador; and in several municipalities across Honduras. Honduras and El Salvador exhibit few geographical agglomerations in addition to these high-potential ecosystems. On the contrary, Guatemala exhibits incipient ecosystems in tourism across the country, and around half of the businesses in the industry do not operate in geographical agglomerations.

Table 4.

CHARACTERISTICS OF BUSINESSES IN THE DATA IN TOURISM, FINANCIAL SERVICES, AND BPO

Country	Industry	Fraction of firms	Sales per firm ^a	Fraction of employment	Sales per worker ^a	Fraction of women-owned firms
Guatemala ^b	Tourism	11%	0.3	4%	0.3	32%
	Financial services	1%	4.8	8%	7.9	34%
	BPO	20%	0.2	7%	0.4	40%
Honduras	Tourism	6%	0.6	6%	0.5	56%
	Financial services	2%	0.2	11%	0.4	22%
	BPO	0%	0.1	0%	0.3	69%
El Salvador	Tourism	6%	0.8	7%	1.4	36%
	Financial services	4%	2.0	4%	4.6	50%
	BPO	4%	0.4	5%	0.4	50%

Note: a. Sales per firm and sales per worker are relative to the average plant in the data.

b. In Guatemala, the fraction of employment is the fraction of the total wage bill (because employment per plant is not available), and sales per worker corresponds to the relative wage bill.

Financial services account for a low fraction of businesses in the data, and most are agglomerated in high-potential ecosystems.

The proxies for productivity for businesses in financial services in the region are quite high relative to the average. In El Salvador, sales per business in the industry are 2 times the sales of the average business, and sales per worker are 4.6 times the sales of the average worker. In Guatemala, sales per business in the industry are 4.8 times the sales of the average business, and the average wage bill in the industry is 8 times the wage bill of the average business. In Honduras, the industry accounts for 2 percent of businesses but 11 percent of the employment in the database. The departments of Guatemala in Guatemala, San Salvador in El Salvador, and Olancho in Honduras exhibit high-potential agglomerations in financial services. Businesses in these ecosystems markedly differ across countries—sales per business in high-potential ecosystems in financial services average USD 3.4 million in El Salvador, USD 261,000 in Guatemala, and around USD 4,000 in Honduras.

El Salvador has two BPO ecosystems: La Libertad-San Salvador metropolitan area and San Miguel. Guatemala exhibits only one ecosystem in the industry in the department of Guatemala.

The BPO industry accounts for 20 percent of the businesses in the data in Guatemala, although their wage bill is 40 percent of the wage bill of the average business, and sales per business are 20 percent the sales of the average business. In El Salvador, the industry accounts for 5 percent of employment in the data, and 50 percent of businesses are owned by women. In Honduras, the industry accounts for only 19 businesses. Most businesses in the industry agglomerate in ecosystems in La Libertad-San Salvador and San Miguel in El Salvador and the department of Guatemala in Guatemala. Yet, almost 40 percent of businesses in the industry in Guatemala do not produce in geographical agglomerations.

3.4. AGRIBUSINESS AND LIGHT MANUFACTURING

Agribusiness accounts for a significant fraction of employment in the data. Agglomerations in the industry are scattered across the region. Agribusiness accounts for 38 percent of employment in the Honduras data and 12 percent of employment in the data for El Salvador (see Table 5). In Guatemala, sales per business in the industry are 3.2 times the sales of the average business, and the wage bill is 4.1 times the average wage bill. In El Salvador, the average firm in the industry employs 62 workers, twice the size of the average business in the data. Agglomerations in agribusiness are

scattered across Central America, and most businesses in the industry operate in these agglomerations (92 percent in Honduras, 77 percent in Guatemala, and 90 percent in El Salvador). Honduras does not exhibit high-potential agglomerations. In Guatemala, the departments of Guatemala, Escuintla, and Zacapa exhibit high-potential agglomerations in agribusinesses, and these agglomerations account for 1.3 percent of business in the data. In El Salvador, the high-potential ecosystems in Sonsonate, La Libertad, y San Vicente agglomerate 3.4 percent of businesses in the data.

Table 5.

CHARACTERISTICS OF BUSINESSES IN THE DATA IN AGRIBUSINESS AND LIGHT MANUFACTURING

Country	Industry	Fraction of firms	Sales per firm ^a	Fraction of employment	Sales per worker ^a	Fraction of women-owned firms
Guatemala ^b	Agribusiness	5%	3.2	19%	4.1	23%
	Light manufacturing	2%	2.1	6%	3.3	24%
Honduras	Agribusiness	36%	0.7	38%	0.8	56%
	Light manufacturing	5%	0.3	3%	0.5	43%
El Salvador	Agribusiness	6%	1.7	12%	0.6	15%
	Light manufacturing	2%	4.3	14%	0.5	38%

Note: a. Sales per firm and sales per worker are relative to the average plant in the data.

b. In Guatemala, the fraction of employment is the fraction of the total wage bill (because employment per plant is not available), and sales per worker corresponds to the relative wage bill.

Light manufacturing accounts for a relatively small fraction of businesses in the data, but in El Salvador, the industry accounts for the largest employers and employs a relatively high fraction of women. Production in light manufacturing is mainly agglomerated in the departments of Guatemala in Guatemala and La Libertad in El Salvador and is scattered across the north of Honduras. Businesses in light manufacturing account for 14 percent of employment in El Salvador but only 2 percent of businesses. The average size of firms in the industry is 216, around seven times the size of the average business in the data. Sales per business are 4.3 times

the sales of the average business in El Salvador, 2.1 times in Guatemala, and only 0.3 times in Honduras. In Guatemala, the average wage bill in the industry is 3.3 times the wage bill of the average business. In Honduras, the industry accounts for 5 percent of businesses, more than twice the fraction in the data for Guatemala and El Salvador. In El Salvador, 43 percent of employees in the industry are women, a high fraction relative to the average across industries of 35 percent. Diversity and quality in light manufacturing are mainly agglomerated in Cortes, Atlantida, Yoro, and Olancho in Honduras; the department of Guatemala in Guatemala; and Santa Ana, La Libertad, and San Salvador in El Salvador.

3.5. A SUMMARY OF HIGH-POTENTIAL LOCAL ECOSYSTEMS IN CENTRAL AMERICA

High-potential ecosystems, in general, grow near capital cities in Central America. High-potential businesses in Guatemala mainly agglomerate in the Guatemala and Escuintla departments (Table 6). In El Salvador, they mainly agglomerate in San Salvador and La Libertad. In Honduras, Comayagua has high-potential agglomerations across several industries. Capital cities in Central America concentrate a larger share of the urban population than reported by official figures. Cities contribute more than 78 percent to the regional economy. Urban areas offer better jobs, higher wages, better access to safe drinking water, and shorter distances to health care facilities (Maria et al. 2017). Broadband penetration is lower in rural areas (ITU 2020), limiting the digital connectivity of firms.

Table 6.

REGIONS WITH MATURING AND HIGH-POTENTIAL ECOSYSTEMS ACROSS INDUSTRIES

	Industry	Maturing	High potential
Guatemala	Digital technologies		Guatemala
	High-tech manufacturing		Escuintla; Guatemala
	Tourism	Sacatepequez	Guatemala
	Financial services	Santa Rosa	Guatemala
	BPO		Guatemala
	Agribusiness	Quetzaltenango	Escuintla; Guatemala; Zacapa; Guatemala
	Light manufacturing		Escuintla; Guatemala; Sacatepequez
Honduras	Digital technologies	Lempira	Atlantida; Comayagua; Olancho; Yoro
	High-tech manufacturing	Copan; Cortes; Lempira; Valle	Atlantida; Yoro
	Tourism	Atlantida; El Paraiso; La Paz; Olancho	Comayagua; Copan; Lempira; Santa Barbara
	Financial services	Yoro	
	BPO	Cortes	Copan; Ocotepeque Olancho; Yoro
	Agribusiness	Copan; El Paraiso; Lempira; Olancho	Valle
	Light manufacturing	Atlantida; Choluteca; El Paraiso; Lempira; Ocotepeque	Comayagua; Copan; Cortes; Intibuca; Olancho; Santa Barbara; Yoro
El Salvador	Digital technologies		San Salvador
	High-tech manufacturing	Santa Ana; Sonsonate	La Libertad; La Paz; San Salvador
	Tourism		La Libertad; San Miguel; San Salvador
	Financial services	San Miguel	La Libertad; San Salvador
	BPO		La Libertad; San Miguel; San Salvador
	Agribusiness	Cabanas; Chalatenango; La Union; Morazan; San Miguel	La Libertad; San Salvador; San Vicente; Sonsonate
	Light manufacturing	La Paz	La Libertad; San Salvador; Santa Ana



04.

**PUBLIC PROGRAMS
AND INTERMEDIARY
ORGANIZATIONS IN
CENTRAL AMERICA**

Costa Rica, El Salvador, Guatemala, and Honduras support entrepreneurship and digital development through more than 241 public programs. The report assessed 118 of these programs.

Few programs provide incubation services for digital and innovation entrepreneurship. Of the 118 programs assessed, only 11 programs provide holistic incubation services for digital entrepreneurs, as follows:

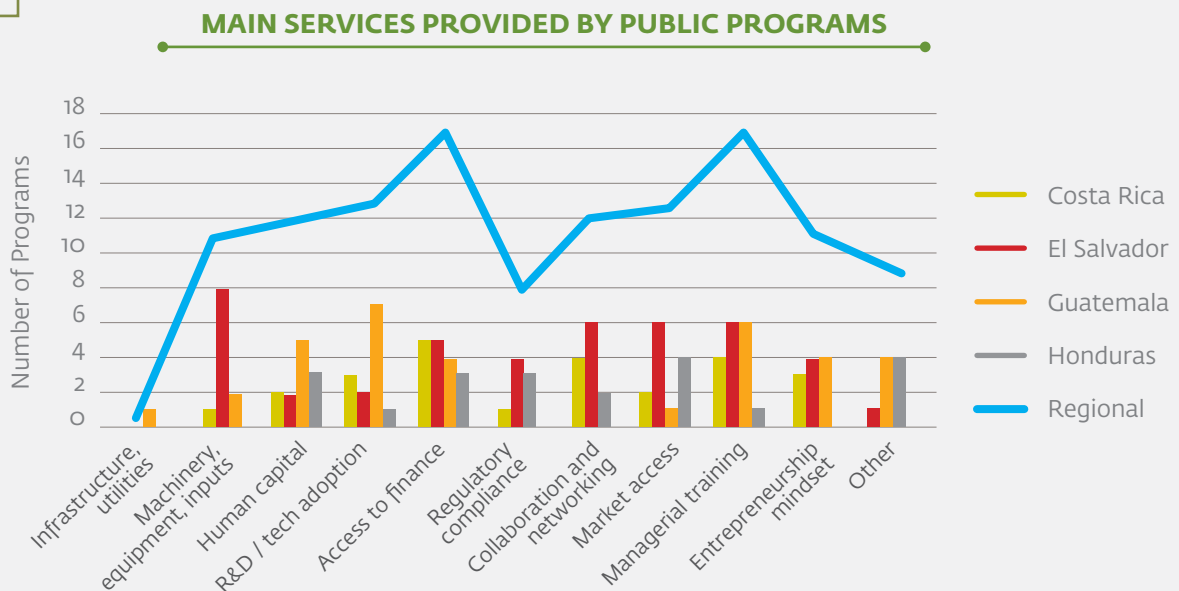
- **Costa Rica:** Agencia Universitaria para la Gestión del Emprendimiento (AUGE), Centro de Emprendimiento e Innovación de la Universidad para la Cooperación Internacional (CEI-UCI), Cámara de Comercio de Costa Rica, Parque Tec, Tec Emprende Lab.
- **Guatemala:** Campus Tec, Progreso X, University del Valle Guatemala, University San Carlos.
- **Honduras:** Honduras Digital Challenge, HUB UNITEC (Universidad Tecnológica Centroamericana).

These programs cover services such as co-working spaces, mentoring, product and service development, links to early-stage financing, and access to markets. Only the Ministry of Communications, Innovation and Technology of Costa Rica maintains an official registry of incubators that support technology-based new firms. Annex A provides the complete list of programs by country. Annex B presents the list and details of the programs that responded to the questionnaires.

Public programs are focused on managerial training and access to finance. (See Figure 13.)

However, as explained later in the document, many entrepreneurs still face barriers to accessing finance. Public programs support Costa Rican firms to increase digital transformation and e-commerce through digital diagnostics, customized postal services, seed capital, and grants. PROCOMER, Costa Rica's national investment and export promotion agency, actively supports Costa Rican information technology (IT) firms accessing foreign markets. Public programs in Costa Rica are focused mainly on business acceleration and scale-up. In El Salvador, public programs are focused on providing equipment, managerial training, and market access. Very few programs offer technology extension services, early-stage advisory, or support to adopt technology in general. In Guatemala, the government promotes entrepreneurship through interventions to support science, technology and innovation, education and training, and access to finance. Most public programs focus on businesses in early phases, younger than three years. In Honduras, the government supports entrepreneurship development through various programs as part of its economic policy, science, technology and innovation, education and training, and market access initiatives. Public programs are focused mainly on early-stage firms, firm scale-up, and access to foreign markets.⁷

Figure 13.



Source: World Bank Entrepreneurship Enabler Survey 2020.

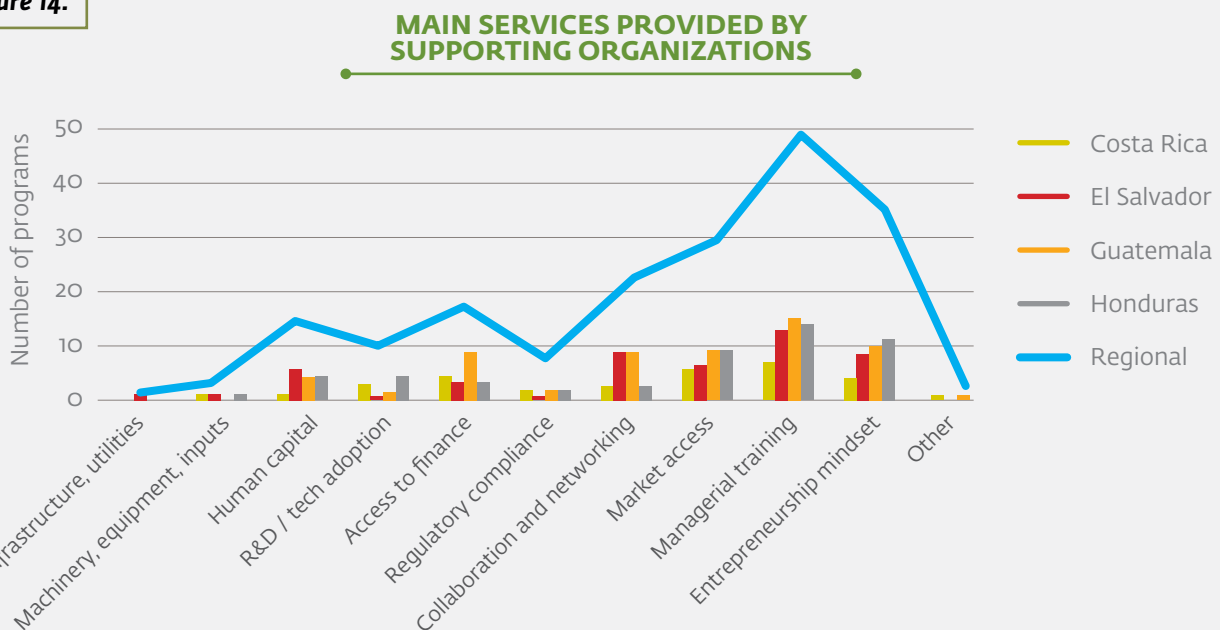
Note: The line labeled "Regional" is the sum of responses from Costa Rica, El Salvador, Guatemala, and Honduras.

⁷ The survey was based on the World Bank's Entrepreneurship Enabler Survey (World Bank 2019) for analyzing public programs and intermediary organizations supporting entrepreneurship.

Most intermediary organizations in Central America are incubators or accelerators primarily focused on managerial training and capacity building for businesses in the early stages. (See Figure 14.) Supporting institutions in Costa Rica are primarily accelerators that target businesses in early phases and seek to increase skills to improve productivity. Institutions represent accelerators, incubators, academic centers, and business associations. Targeted beneficiaries are individual entrepreneurs and firms in early phases. In El Salvador, most institutions are incubators or accelerators that offer managerial and professional training for entrepreneurs, collaborative networks, and early-stage advisory. Over half of them offer technology extension services. In Guatemala, most organizations support entrepreneurial

mindset, business education, network collaboration, services for market access, and trade fairs. Half of the intermediary organizations provide technology adoption services and offer co-working spaces and incubation and acceleration programs. Supporting institutions in Honduras represent a wide variety of organizations that are part of the ecosystem. Most consider themselves public-private institutions. Most intermediary organizations operate as accelerators and incubators. Academic research and entrepreneurship centers are actively represented in the ecosystem. Most intermediary organizations support the early stages of business development. They have incubation and acceleration services, including co-working spaces, early-stage infrastructure, and advisory services.

Figure 14.



Source: World Bank Entrepreneurship Enabler Survey 2020.

Note: The line labeled "Regional" is the sum of responses from Costa Rica, El Salvador, Guatemala, and Honduras.

However, access to finance is still an underserved area in most countries of Central America.

Intermediary organization program managers in Costa Rica agree with public policy officials that the main barrier to entrepreneurship is access to finance. Although there are various intermediary organizations offering access to finance, in Costa Rica, only 4 of 13 intermediary organizations report supporting businesses through equity finance. In El Salvador, only 3 of 15 intermediary organizations report supporting businesses through access to finance. Likewise, in

Guatemala, only a few intermediary organizations provide financing support, such as grants/vouchers, equity finance, credit guarantees, and loans. In Honduras, most intermediary organizations provide a variety of enterprise development services, but only 4 of 14 programs integrate access to finance as part of their programs. These intermediary organizations integrate access to finance, through grants, equity finance, and credit guarantees, with incubation and scale-up services.

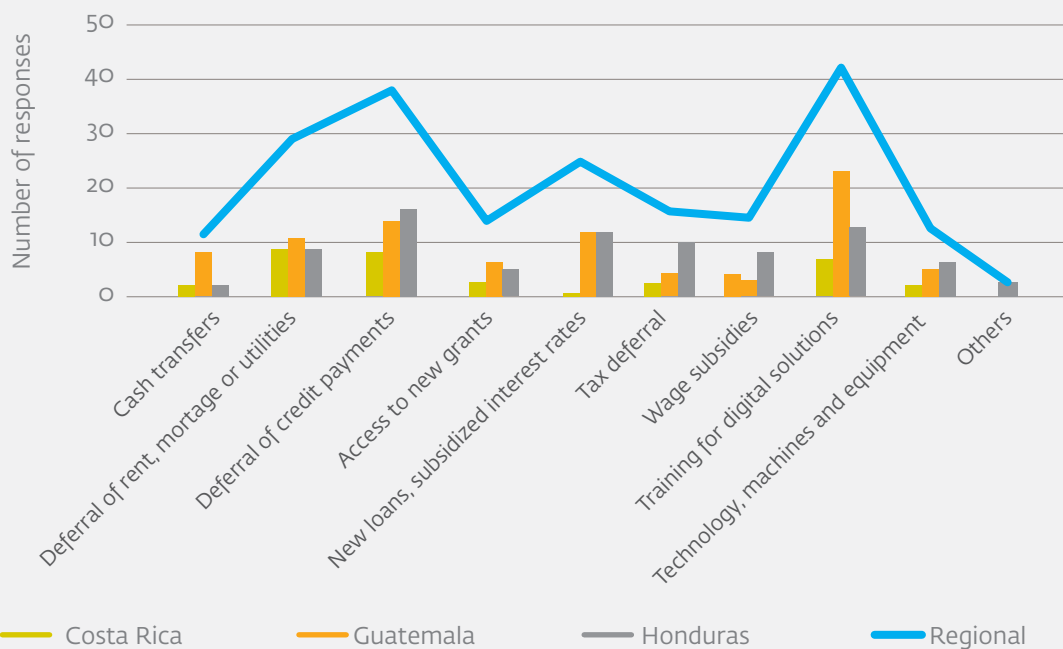
More detailed comparable information on the effectiveness of different approaches on digital start-ups is necessary. The analysis of program information conducted in this study is limited to the general characteristics of programs. Only 47 percent of programs surveyed reported conducting impact evaluations. Knowing and sharing information about the effectiveness of programs in the ecosystem can enhance high-impact interventions to support start-ups through effective tools and methodologies. For example, the main service provided by public programs and intermediary organizations is managerial training. It would be valuable to learn about the effectiveness of these programs among different target groups. In the same manner, it would be helpful to learn about the effectiveness of early-stage financial support (grants and seed capital) for start-ups.

Recently, due to COVID-19, most countries are aligning their programs to adapt to technologies and comply with sanitary protocols, but they need a lot of support and training on digital solutions.

(See Figure 15.) In Costa Rica, public programs and intermediary organizations aligned resources to support MSMEs through technical assistance and some access to finance. The government of Costa Rica also supported firms through FoPYme and the Development Bank System through seed capital, grants, and subsidized loans. Intermediary organizations report that they have provided support to comply with COVID-19 sanitary protocols and managerial training. In Guatemala, supporting the adoption of digital solutions is a priority for the COVID-19 response. Intermediary organizations have adapted managerial training and strengthened support to adopt digital solutions. In Honduras, public policy officials and intermediary organization program managers agree that the most-needed support for businesses to alleviate the impact of COVID-19 is related to more flexible terms for debt. Although there have been adaptations from the countries, most companies have stated that they need support or training for digital solutions, deferral of credit payments, deferral of mortgage and rent payments, and new subsidized loans.

Figure 15.

MOST-NEEDED SUPPORT FOR MSMEs' RECOVERY DURING COVID-19: RESPONSES OF PUBLIC PROGRAMS AND INTERMEDIARY ORGANIZATIONS



Source: WBG Surveys to Public Policy Instruments and supporting organizations. August- December 2020.

Note: The regional data labeled "Regional" is the sum of responses from Costa Rica, Guatemala and Honduras. The survey for El Salvador was launched earlier and did not include COVID-19 related questions.

The remainder of this section summarizes the government programs and private and non-governmental organizations that are available to support entrepreneurs in each country in the region.

4.1. GOVERNMENT PROGRAMS SUPPORTING ENTREPRENEURSHIP

COSTA RICA

The Government of Costa Rica supports enterprise development through various programs as part of its economic policy, science, technology and innovation, education and training, and market access initiatives. The main services provided to entrepreneurs and MSMEs are in market access and support to comply with regulations. The largest part of the reported public policy programs is devoted to access to finance and incentives through established funds to promote entrepreneurial innovation, adoption of technologies, and human capital, about USD 3.3 million for 2019. The assessment includes information from six government programs.

Public programs support Costa Rican firms to increase digital transformation and e-commerce through digital diagnostics (Chequeo Digital), customized postal services, seed capital, and grants. The Ministry of Science, Technology and Telecommunications (MICIT), in coordination with the Ministry of Economy, Investment and Trade (MEIC), maintains the Small and Medium Enterprise Support Program (PROPYME) devoted to promoting innovation and technological development among MSMEs. MICIT also maintains an official registry of incubators that support new technology-based firms. MEIC started to implement the Digital MSME program, based on the Digital Check methodology, developed by the InterAmerican Development Bank. This digital tool assesses the capacities of MSMEs and provides a roadmap for digital transformation. The National

Postal Services, Correos de Costa Rica, supports MSME e-commerce in logistics and e-commerce delivery through the PYME-Express program, while the National Institute for Women implements two programs to promote technology adoption among women entrepreneurs through Ramp-Up and Seedstars Costa Rica. The National Development Banking System complements these efforts through grants, seed capital, equity finance, loans, and guarantees. MSMEs can access these services through first-tier financial institutions.

PROCOMER, the national investment and export promotion agency, actively supports Costa Rican IT firms in accessing foreign markets. PROCOMER prioritizes digital services and supports firms with market research, demand alerts, sector-specific advisory services, trade promotion, and participation in trade fairs. Their approach is to help exporters reduce the competitiveness gaps. Currently, PROCOMER implements a program for digital services exporters to close gaps to compete in the United States digital services market. Entrepreneurs regard PROCOMER as the most effective government agency in Costa Rica.

Public programs in Costa Rica focus mainly on business acceleration and scale-up. Most programs are accelerators, focused on firms' early phases of 1–3 years. Target beneficiaries are, by and large, enterprises of more than two workers, and over half of the programs have no sector orientation, while the rest target services, IT services, and manufacturing.



EL SALVADOR

In El Salvador, programs administered by the Ministry of Economy mainly target gaps in the supply pillars, whereas programs run by the National Micro and Small Business Commission (CONAMYPE) mainly target gaps in the demand pillars. The survey covers eight programs run by CONAMYPE, four programs run by the Development Bank of El Salvador (BANDESAL), and three programs run by the Ministry of Economy. Nine of these programs are run by women (four in BANDESAL and five in CONAMYPE). BANDESAL mainly offers support to access equipment (supply pillar), support to access finance (barrier), and managerial training (demand pillar). In contrast, CONAMYPE seems oriented toward closing gaps in the demand pillars of the entrepreneurship ecosystem, whereas the Ministry of Economy seems to target supply pillars. Most resources seem allocated to support access to equipment and the development of managerial capabilities; support to adopt technology receives only around USD 8,000 per year. Nine public programs are oriented toward established businesses or have no age orientation, whereas six mainly specialize in start-ups (0–3 years).

As of May 2020, very few programs offered by BANDESAL, CONAMYPE, and the Ministry of Economy offer technology extension services, early-stage advisory, or support to adopt technology in general. Around half of the public programs surveyed support the creation of businesses, and only two support R&D and the adoption or diffusion of technology. The main services provided are associated with access to machinery, equipment, or material inputs; access to markets (both national and international); and managerial and professional training for entrepreneurs. Most programs offer business education and networking events and other activities to promote collaboration in the ecosystem. Only two offer technology extension services, and only one offers early-stage infrastructure or advisory. Only four programs report the adoption of new technologies as one of

the main expected outcomes. One program (run by the Ministry of Economy) targets businesses in IT services, and two target businesses in manufacturing; the rest of the programs reported in surveys had no sectoral orientation. More recently, the Ministry of Economy started supporting digital transformation through Digital Check, with the support of the InterAmerican Development Bank; the E-Pyme acceleration program to develop e-commerce capacities among MSMEs; Skills in the Cloud with the support of Amazon Web Services to develop cloud computing skills among STEM students; and E-Lancers to promote information and communication technology (ICT) freelancers' participation on global platforms. As part of the response to COVID-19, the Government of El Salvador established a USD 600 million economic recovery fund to support MSMEs through loans, subsidies, and credit to the informal sector.

GUATEMALA

The Government of Guatemala promotes entrepreneurship through interventions to support science, technology and innovation, education and training, and access to finance. The Ministry of Economy is the leading government institution implementing and coordinating interventions. Programs focus mainly on business scale-up, skills development, and job creation. Most programs focus on businesses in early phases below three years of existence. Over half of the programs have no sector orientation, while the other half target agriculture, handcrafts, and manufacturing. Target beneficiaries are, by and large, individual entrepreneurs. No public program specifically focuses on digital technologies or digital transformation. The assessment includes information from 15 government programs.

HONDURAS

The Government of Honduras supports enterprise development through various programs as part of its economic policy, science, technology and innovation, education and training, and market access initiatives. Consistent with the importance of the agribusiness sector in Honduras, the Secretariat of Agriculture has the highest budget among public programs. The Honduran Institute of Science, Technology and Innovation (IHCIETI) and the Secretariat for Economic Development (SDE) play important roles in supporting enterprise development. The National Service for Entrepreneurship and Small Business (SENPRENDE), which serves as the MSME coordination system under SDE, is responsible for coordination among the Honduran government and SBDCs to promote policies and improve capacities for micro and small businesses. SENPRENDE coordinates 12 SBDCs in Honduras. The main areas of support that public programs provide to entrepreneurs aim to help them comply with current regulations and food and safety protocols. Other areas include support to access financing, market access, and managerial training. SENPRENDE, with the support of CENPROMYPE, is coordinating a train the trainers program to develop the capacities of SBDCs in e-commerce. In addition to SENPRENDE, the other three public programs report training and technical support on digital solutions for businesses. The assessment includes information from nine government programs.

In Honduras, public programs offer a variety of services and links to financial instruments and focus mainly on early-stage firms, firm scale-up, and access to foreign markets. Services for enterprise development included managerial skills, networks and markets, and technology adoption, and three of them also link to access to finance, providing grants, seed capital, equity finance, and loans and credit. Most programs are focused on early phases, firms less than one year old, and those 1–3 years old. Target beneficiaries are, by and large, individual entrepreneurs, and over half of the programs have no sector orientation, while the rest target agriculture, handcrafts, and manufacturing.

In general, even though there are public programs supporting entrepreneurship, not much effort is devoted to scaling them up strategically by widely sharing information about the effectiveness of programs and the fit between the program contents and the needs of beneficiaries. Efforts to design and coordinate policies and capacity-building programs need to trigger dynamism in the entrepreneurship ecosystem. This dynamism should be measurable in terms of the number of start-ups, the number of technologies implemented, MSME innovation ventures, capital investments, and loans and the ability of MSMEs to repay them.

4.2. INTERMEDIARY ORGANIZATIONS SUPPORTING ENTREPRENEURSHIP

COSTA RICA

Intermediary organizations that contributed to this study in Costa Rica provide a variety of enterprise development services. Most are primarily focused on managerial training and capacity building, but also collaborative networks and markets, access to finance through equity finance, technology adoption, research and development, and gender inclusion. The assessment includes information from 13 organizations. Four of them are registered incubators that provide services to new technology-based firms. Among the intermediary organizations that reported information in this study, Parque Tec is notable because of its holistic approach to developing digital entrepreneurs (Box 1).

Intermediary organizations in Costa Rica that responded to this study are primarily accelerators that target businesses in early phases and seek to increase skills to improve productivity. Intermediary organizations include accelerators, incubators, academic centers, and business associations. Targeted

beneficiaries are individual entrepreneurs and firms in early phases (less than one year and 1–3 years). Most intermediary organizations have no sector orientation, and others focus on manufacturing, IT services, agriculture, and services other than IT. Over half of the intermediary organizations reported promoting increased skills for productivity as a primary outcome. The main services offered by intermediary organizations are managerial training, promoting entrepreneurial culture, and market access.

Access to finance is an underserved area in Costa Rica. Intermediary organization program managers agree with public officials that the main barriers to entrepreneurship are access to finance and managerial capabilities. However, only 4 of 13 organizations support businesses through equity finance. Digital entrepreneurs report obtaining venture capital from foreign acceleration programs. From the private sector's point of view, lack of collaboration among actors in the ecosystem and access to markets are also important barriers.

Box 1.

PARQUE TEC / INVERT-UP

In Costa Rica, Parque Tec and Invert-Up are regional best practices that implement state-of-the-art acceleration programs for digital entrepreneurs. Parque Tec helps entrepreneurs build and scale up their start-ups with an emphasis on raising equity investment. It provides business coaching; strategic and innovation management; an accounting tracking platform; networking and strategic alliances; workshops in finance, marketing, and customer development; access to investors, financial institutions, and boards of directors; and physical space, office services, and connectivity. The program links to international accelerators and investment vehicles. Through Invert-Up (equity finance), start-ups receive mentoring and investments. Parque Tec and Invert-Up integrate a diversified portfolio of start-ups, minimizing the risk for investors and generating clear strategies for entrepreneurs. Invert-Up is the first investment vehicle in the Central American region that allows the investor to settle the shares acquired through a private offering of shares on the National Stock Exchange of Costa Rica, ensuring transparency and international best practices.

EL SALVADOR

In El Salvador, intermediary organizations mainly target gaps in the demand pillars of the entrepreneurship ecosystem. The analysis of intermediary organizations covers 16 institutions: four are research or educational organizations (three of which also help both incubate and accelerate businesses), one is an incubator only, four are accelerators only, five both incubate and accelerate businesses, one is a not-for-profit advisory organization, and one is an industry association. However, none of these programs seems to incubate tech entrepreneurs. Six organizations were founded before 2010, and only five started operations after 2015. Only four organizations are managed by a woman. Most intermediary organizations offer managerial and professional training for entrepreneurs, work to strengthen collaboration in the ecosystem, and work to change mindsets concerning entrepreneurship in El Salvador. In addition to these services, most resources seem allocated to support businesses complying with regulations. Eight supporting organizations are oriented toward established businesses or have no age orientation, whereas seven mainly target start-ups (0–3 years).

Slightly over half of surveyed intermediary organizations in El Salvador offer technology extension services and early-stage advisory. Most intermediary organizations mainly offer business education for entrepreneurship, collaborative networks, and early-stage infrastructure and advisory, which they consider their most effective service. Eight intermediary organizations offer technology extension services. The main expected outcome for most intermediary organizations is business scale-up. Many also expect to build up the ecosystem. Five supporting organizations expect to promote the entry of women and youth into entrepreneurship.

GUATEMALA

In 2019, 26 intermediary organizations managed USD 4.2 million in budget to support entrepreneurship in Guatemala. Their main objectives were to help create and scale up businesses and build the entrepreneurship ecosystem in Guatemala. These organizations support entrepreneurial mindset, business education, network collaboration, services for market access, and trade fairs. Half of the intermediary organizations provide technology adoption services, and about 10 offer co-working spaces and incubation and acceleration programs. Only a few organizations provide financing support, such as grants or vouchers, equity finance, credit guarantees, and loans. Five of the 26 intermediary organizations implement a holistic approach to entrepreneurship by supporting access to finance (grants, private equity, credit guarantees), incubation and scale-up services, and collaborative networks. The assessment identified four programs that provide incubation services to new technology-based firms: Campus Tec, Progreso X, University San Carlos, and University Del Valle.

In both Guatemala and Honduras, intermediary organizations serve a variety of beneficiaries and sector orientations. Most organizations consider themselves to be private sector institutions, use private funding, and operate as accelerators and incubators. The main target beneficiaries are young businesses operating as individuals or firms, but also cooperatives, business associations, and financial institutions. Although almost two-thirds of the organizations have no sector orientation, the rest target specific sectors such as manufacturing, agriculture, IT services, and retail. Some have had a substantial impact (Box 2).

Box 2.**SUCCESS STORIES IN GUATEMALA**

Despite the relatively small scale of intermediary organizations in Guatemala, there are success stories of high impact in the digital entrepreneurship ecosystem. The organizations' leaders believe their organizations to be most effective when delivering technology extension services and early-stage infrastructure and advisory. Progreso X, part of the corporate responsibility strategy of the largest cement company in Guatemala, implements a state-of-the-art entrepreneurship development program that promotes competition, cultivates entrepreneurial culture, and connects start-ups and corporations. Other success cases include Campus Tec, a modern technology incubator real estate project, as well as University Del Valle and Francisco Marroquin, which supports entrepreneurship incorporation and conducts rigorous research and policy advocacy. Bantrab, an active player in providing solutions to MSMEs, is investing in integrating with acceleration programs and developing targeted solutions for start-ups.

HONDURAS

In Honduras, intermediary organizations implemented by the private sector, NGOs, and public-private partnerships provide a variety of enterprise development services, but only a few integrate access to finance as part of their programs. Eighteen intermediary organizations provided data on their programs and services to support the entrepreneurship ecosystem. The main services offered by private organizations and NGOs are managerial training, promoting entrepreneurial culture, and network collaboration, including services for market access and trade fairs. These intermediary organizations provide a wide variety of other services, like building human capital, R&D, and access to finance on a minor scale. Over half of the intermediary organizations provide technology adoption services, and about seven of them support firms through co-working spaces and incubation and acceleration programs. Much less support to firms is in access to finance. Only a few programs support firms through grants and equity finance. Some have had a substantial impact (Box 3). The Centers for MSME Enterprise Development (CDEs) are part of the SENPRENDE network, under public-private alliances. These centers operate independently, have other funding sources and technical assistance, and adapt their services to the demand and needs of local firms in the regions where they operate. CDEs implemented about 78 percent of the total budget resources of intermediary organizations in 2019.

Box 3.**SUCCESS STORIES IN HONDURAS**

Honduras Digital Challenge (HDC) is a partnership of private sector organizations, led by Banco Atlantida, that implements a comprehensive digital start-up incubation model in Honduras. The program supports selected entrepreneurs through a 12-week program during which participants acquire technical, financial, and leadership skills, learn from experienced tutors and mentors, and obtain access to digital tools, co-working space, and seed capital. The program has also strengthened its collaboration with accelerators and investment firms across Latin America in order to facilitate entrepreneurs' access to capital, help them land new partnerships, and prepare them for the next stages of growth.

Since 2017, the program has graduated 39 emerging tech companies across the country.

This initiative has evolved to a platform that is succeeding in connecting the ecosystem, integrating start-up entrepreneurs, and catalyzing the resources of financial institutions, academic centers, investors, and donor-funded programs. HDC leaders believe that the interest of institutional venture capital investors will increase as the market matures. Meanwhile, the small size of the local market limits the potential of start-ups to capture investment. To generate volume and attract venture capitalists, start-ups need to create proposals with an expanded market vision. HDC and its partners also advocate for improving the business climate. HDC leaders believe that the ecosystem requires—in addition to incubation programs—policies that provide tax incentives for incubation and acceleration programs for innovative start-ups and the digital transformation of MSMEs.



05.

ADOPTION OF TECHNOLOGY

5.1 DEMAND FOR TECHNOLOGY

The digital ecosystem is more important than ever.

Firms need to digitalize their operations and sales to adapt to the post-COVID situation. It is necessary to digitalize sales, marketing, and production processes to transform the supply chain in order to be competitive.

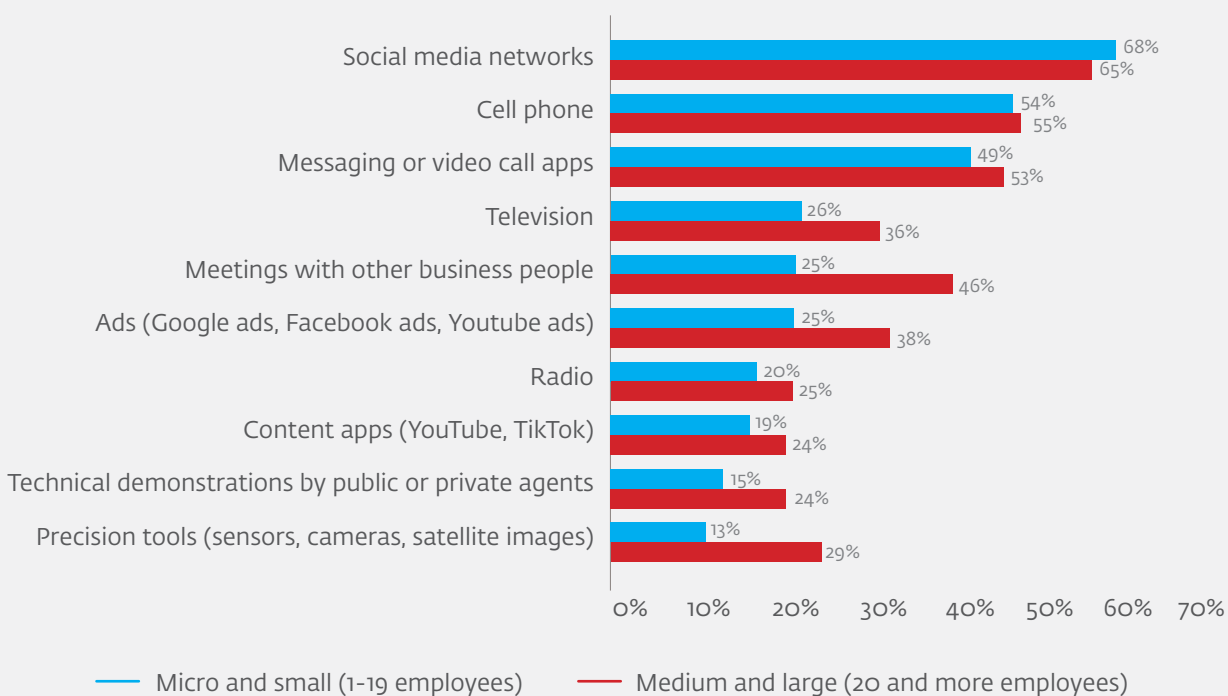
Small firms in Central America are just beginning to adopt technology, although there has been some progress recently due to COVID-19.

Most Central American firms are still using manual methods and basic digital tools to manage their operations, sales, marketing, and decision-making processes (Figure 16). Production and back-office operations such as procurement and supply chain management are even less digitized—Central American firms have focused more on digitizing their sales interfaces and channels than on their back offices and supply chains. Firms' use of online stores and marketplaces is still limited in the region, and most firms use methods

such as social media, messaging apps, and cash transactions. Firms that already use digital payments see them as much less risky than cash-based transactions, but there are high commissions for trans-border transactions, and there remains a need to dispel concerns about fraud in digital payments with firms that still transact in cash. However, the COVID-19 crisis has forced buyers in the region to go online, and firms have followed. Two-thirds of micro and small firms report increases in online sales during COVID-19 (Figure 17). The growth of online orders has created new challenges for Central American firms. Fifty-three percent of microenterprises report increased delivery times. Over a quarter of firms in all size categories report order volumes that have exceeded capacity and challenges with identifying reliable suppliers. There are practically no differences between comparable women- and men-led firms in the adoption of technologies.

Figure 16.

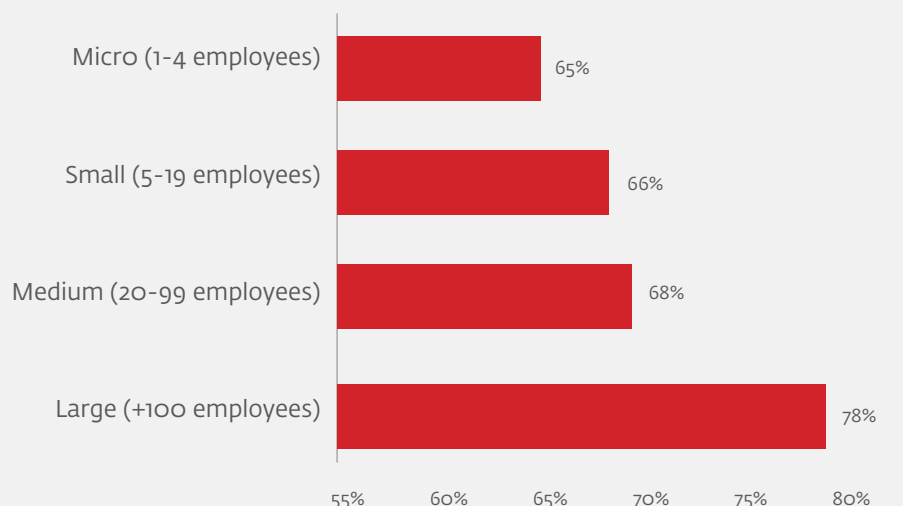
ADOPTION OF TECHNOLOGIES TO CONNECT ONLINE, MAKE DECISIONS, MANAGE SALES AND MARKETING, AND ANALYZE CUSTOMERS, BY FIRM SIZE



Source: Digital Technology Support Survey IFC 2021.

Figure 17.

PERCENT OF FIRMS THAT HAVE INCREASED ONLINE SALES DUE TO COVID, BY FIRM SIZE



Source: Digital Technology Support Survey IFC 2021.

However, midsize and larger firms are quite well on their way in using more sophisticated technologies. Forty-two percent use broadband, and 14 percent use fifth-generation wireless technology (5G) to connect online, while 38 percent use customer relationship management tools for marketing and sales, and 27 percent use artificial intelligence (AI) to analyze customers. Larger firms have also started to adopt virtual reality and blockchain to streamline and scale their customer interactions and business operations. Midsize and large firms have also sought to hire technical talent able to leverage these technologies: 35 percent of large firms have hired programmers, and 17 percent have hired in-house engineers to leverage technologies. Like small firms, large firms report an increased impetus to digitize due to COVID-19. Seventy-eight percent of large firms report increases in online sales during COVID-19, and 55 percent of large firms report increased delivery times.

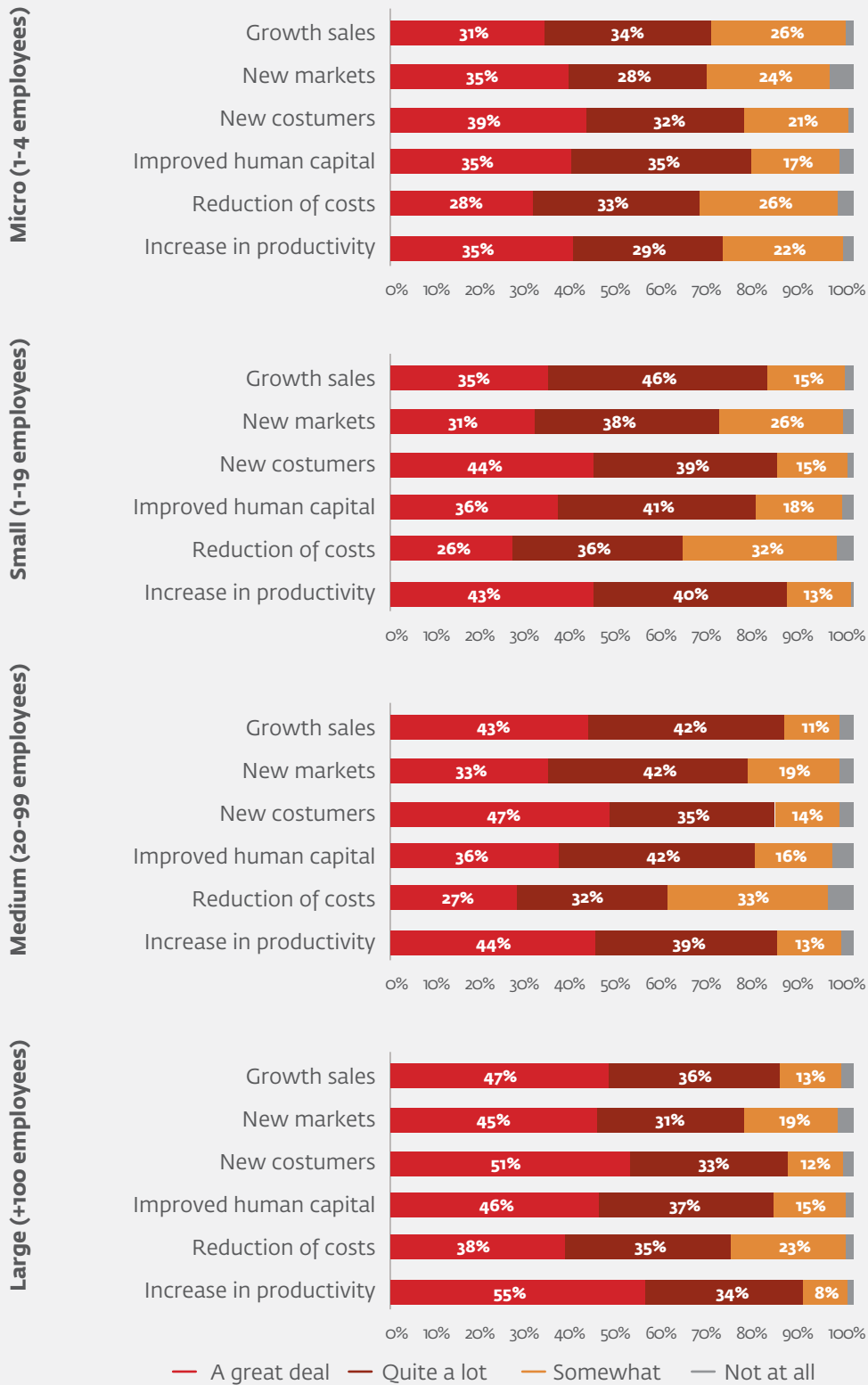
Across firm size categories, faster-growing, export-driven firms, especially in financial and BPO services, are especially likely to use sophisticated technologies. Across sectors, firms in financial and BPO services stand out as first adopters of technologies, likely partly because their customers tend to be particularly digitized. About three-quarters of firms in these sectors have used cloud computing for at least one year, and over 60 percent have adopted

real-time market information tools, cybersecurity technologies, and e-commerce platforms. Firms in services sectors also tend to perceive themselves as using technologies more intensively. For example, midsize and large BPO and financial services firms rate the intensity of their technology use above 9 points on a 10 point scale in such areas as human resources, quality control, and sales and marketing, while midsize and large agricultural firms rate their technology use at 7.5 points out of 10.

Firms that use technologies intensively grow faster and are more productive. This is partly because more productive firms have more resources to adopt technologies and talent, but it is also because technologies have made their adopters more productive. Over 40 percent of small and medium firms and over 50 percent of large firms that have adopted technologies intensively also report having gained new customers and increased their productivity due to new technologies (Figure 18). Meanwhile, only a third of firms that use technologies less intensively, or “incipient digitizers,” report such gains. The majority of firms of all sizes have yet to use more sophisticated technologies such as AI, virtual reality, blockchain, or even e-commerce. This suggests that there are in Central America great opportunities for efficiency gains through the adoption of technology.

Figure 18.

GAINS FROM THE ADOPTION OF TECHNOLOGIES, BY FIRM SIZE AND DIGITAL INTENSITY—MATURE DIGITIZERS (TOP-50 PERCENTILE IN INTENSITY OF USING TECHNOLOGIES)

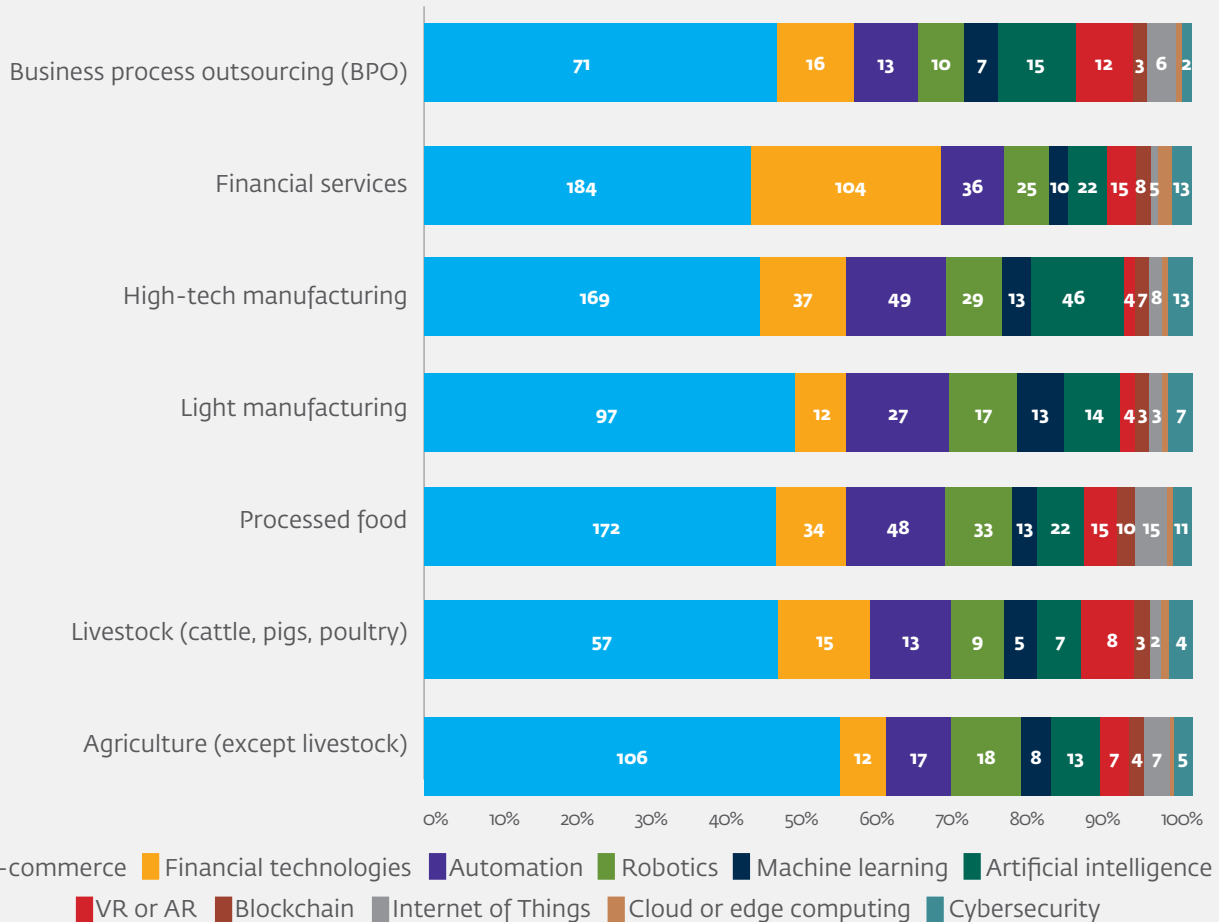


Source: Digital Technology Support Survey IFC 2021.

Firms in the region see e-commerce, fintech, and robotics as especially transformative in their sectors over the next decade. Over 40 percent of firms see e-commerce as the most transformative technology in their sector, over a quarter of firms in financial services see fintech as the most important technology, and some 20 percent of manufacturing firms see automation and AI as most transformative technologies in the coming decade (Figure 19).

Figure 19.

NUMBER OF FIRMS SEEING A TECHNOLOGY AS MOST IMPACTFUL TECHNOLOGY IN THEIR SECTOR IN THE NEXT DECADE, BY SECTOR



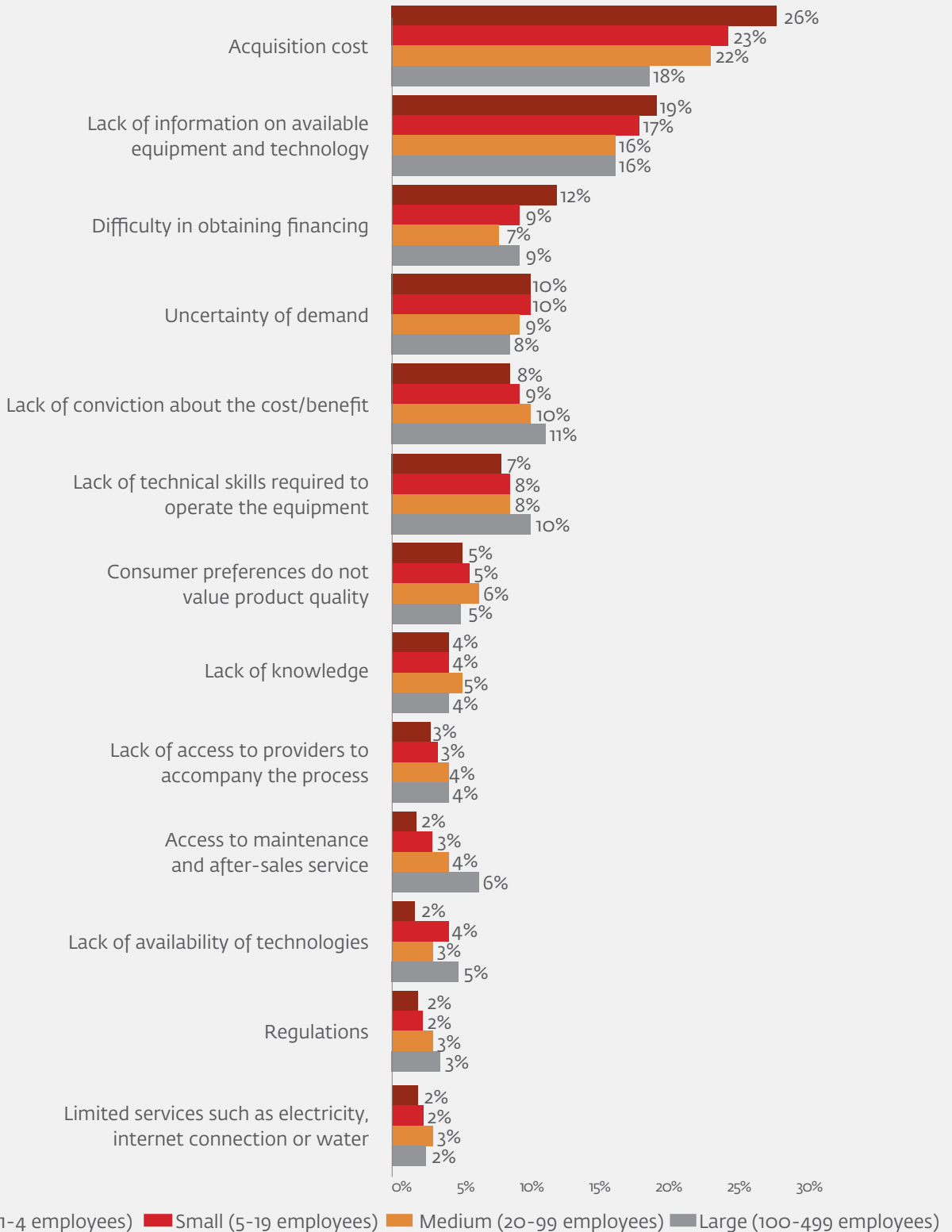
Source: Digital Technology Support Survey IFC 2021.

5.2 CHALLENGES FIRMS FACE IN ADOPTING TECHNOLOGIES

Firms perceive challenges to adopting technologies. The challenges include lack of awareness about what technologies exist, uncertainties about the return on investment in technologies, and lack of access to finance and talent to acquire and use technologies. Twenty-six percent of microenterprises and 23 percent of small firms report challenges with the cost of acquiring technologies, and 19 percent of microenterprises and 17 percent of small firms feel they lack adequate information on available technologies. Some 36 percent of midsize firms and 33 percent of large firms cite workforce skills gaps such as a lack of highly trained professionals in their countries as challenges to the use of technology (Figure 20).

Figure 20.

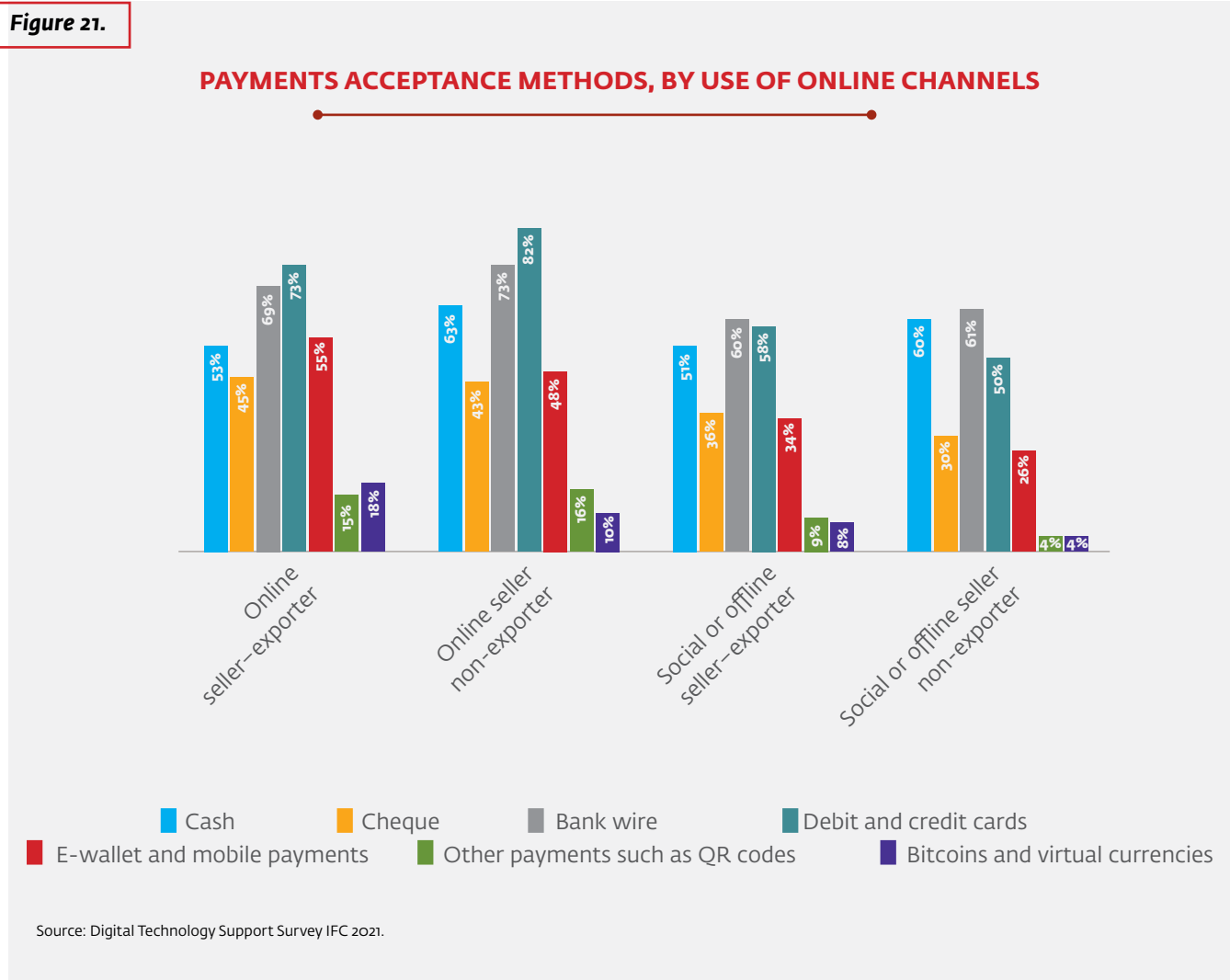
PERCENTAGE OF FIRMS MENTIONING AN OBSTACLE TO ADOPTING NEW EQUIPMENT, MACHINERY, SOFTWARE, OR DIGITIZING PROCESSES, BY FIRM SIZE



Source: Digital Technology Support Survey IFC 2021.

Payments are another opportunity and challenge for the regional firms to gain new efficiencies and interact with customers. Especially online seller-exporters are embracing digital payments such as cards and e-wallets (Figure 21) and have to an extent overcome their less digitized peers' concerns about payment fraud. Less digitized sellers that do not yet have online stores or presence on marketplaces worry about the security of e-wallets and mobile payments, suggesting a need for greater awareness building for firms about digital transactions. Also, high commissions are an obstacle for e-payments.

Figure 21.



Another challenge that firms perceive is a need for support. Over three-quarters of firms across size categories learn about technologies from national and international technology suppliers. Although technology providers are supplying technical assistance to adopt their technologies, companies in all countries need further support. So far, over 50 percent of micro and small firms across all countries of Central America have gained technical assistance to adopt technologies from technology providers. However, a fifth or fewer have secured further technical assistance from their governments. Over 40 percent of micro and small firms in Costa Rica, El Salvador, Honduras, and Panama, and over 50 percent of micro and small firms in Guatemala and Nicaragua call for training and education to be better placed to adopt new technologies, and over a third call for support in identifying new technologies. Large firms across all six countries have these same needs for additional support.

5.3. USE OF TECHNOLOGY BY TECH COMPANIES

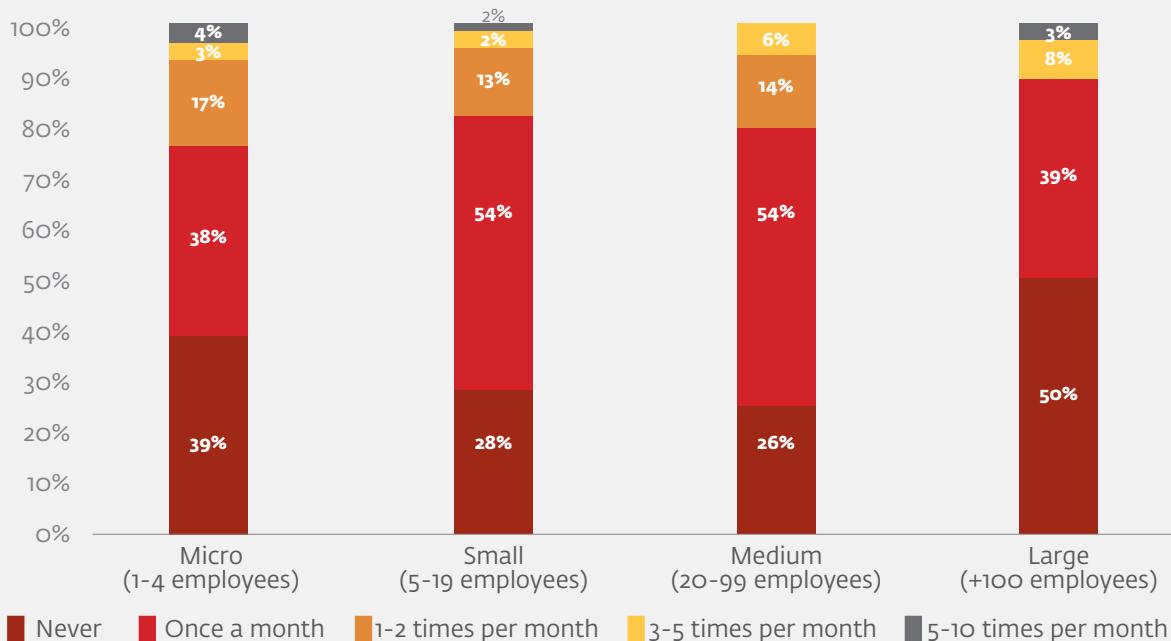
Most digital technology providers in all size categories are using broadband and fourth generation (4G) mobile connections. Fifty-four percent of micro and small and 50 percent of midsize and large firms are using broadband. Thirty-seven percent of micro and small and 28 percent of midsize and large firms are using 4G mobile connections. Fifty-six percent of larger firms also connect online using fiberoptics and 19 percent use other wired broadband subscriptions (including DSL and cable modem) and satellite connections.

Connectivity is still a problem in the region.

One-half of large firms do not report any interruptions in Internet connectivity, but 20 percent of midsize firms and 11 percent of large firms experience three or more interruptions per month (Figure 22). Microenterprises have even more challenges with quality connections, and 24 percent still have interruptions in internet connections three or more times per month. To greater and lesser degrees, countries in the region are also subject to power outages—such as the September 16, 2019 blackout affecting millions of people across four countries—that interrupt business continuity.

Figure 22.

PERCENTAGE OF FIRMS EXPERIENCING SERVICE INTERRUPTIONS IN 2019



Source: Digital Technology Support Survey IFC 2021.

Firms are adopting open source technologies. About a quarter of regional digital service providers leverage open source technologies. Twenty-three percent of microenterprises and 17 percent of small firms use their own developments, and another 14 percent and 8 percent, respectively, use combinations of their own developments and open source technologies.

To penetrate international markets, midsize and large companies seek advice from business associations and export promotion agencies.

Thirty-six percent of small and 47 percent of midsize and large exporters have sought advice from business associations, and a quarter have sought assistance from export promotion agencies. Over 90 percent of micro and small non-exporters have not received (or sought) assistance from export promotion agencies.

5.4. CHALLENGES FACED BY DIGITAL PROVIDERS AND OTHER ENTREPRENEURS

Central American digital service providers face significant challenges with respect to the business environment and regulatory framework, e-government services, access to finance, access to markets, human capital, and support from public policies. Business registration, taxes, access to finance, intellectual property protection, cybersecurity, and regulations that have not adapted to the needs of the countries are the main challenges for the use of digital services in Central America. In international markets, digital service providers feel hampered by limited access to customers and information. Providers across size categories also face challenges in recruiting talent due to perceived workforce skills gaps and a lack of good local training programs. Public policy does not favor the technology industry.

BUSINESS ENVIRONMENT AND REGULATORY FRAMEWORK

Digital service providers see the business environment as the main challenge for the use of digital services in their countries. Central America faces a lot of bureaucracy. Fifty-two percent of firms in Costa Rica cite challenges with fiscal regulations (Figure 23). Fifty-two percent of firms in Nicaragua cite business registration, and well over a third of firms in all countries cite cybersecurity risks as barriers to digital services provision in their countries. Guatemalan companies also mention the issue of formalization of entrepreneurs and limitations on e-commerce as their main challenges. Although there has been some progress in terms of regulations to facilitate formalization, barriers to the closure of companies due to rigid bureaucracies are strong disincentives for opening and formalizing them, slowing down entrepreneurs and investors. Furthermore, companies highlight that there are many customs and logistical hurdles to importing or exporting products online. They also face problems with obtaining other permits, such as phyto-sanitary, environmental, and health permits. In addition, there is scattered information, separate and distinct offices that must be visited, and the payment of numerous fees. There are also problems with intellectual property protection. Costa Rican companies, for instance, point out that the process of

registering a patent is very long and costly and does not adapt to technological change. Various countries of Central America have promoted anti-red tape laws, but they need to reinforce implementation.

Entrepreneurs also point to outdated regulatory frameworks. Regulations have not adapted to technological innovation. Several legal provisions were created some time ago without taking into account new technologies and the need for e-commerce. Existing regulations may also prevent the formation of highly innovative start-ups due to entry barriers, for instance, in fintech. Issues in tax regimes and lack of incentives are also complicated because there are many taxes that affect entrepreneurs and companies. Digital entrepreneurs also face issues with personal data protection and minimum wage laws. There also are barriers in terms of legislation, tools, and functioning of banking and finance. In addition, the legal and administrative frameworks for bankruptcy in Central America plunge entrepreneurs into long and costly processes.

E-GOVERNMENT SERVICES

Entrepreneurs also mention insufficient e-government and customer services as challenges. Government services are complicated and time-consuming. Many government agencies improved their online services during the pandemic, but there are still many services that need digitalization for companies to be successful. There is little interconnection and interoperability, locally or regionally. Limited interconnection constrains the adoption of new digital technologies. There is no generally accepted local electronic payment method for government services. Most countries of Central America already have approved electronic signature laws. However, in most cases, they are not fully implemented. Companies have also highlighted the lack of customer service during the pandemic. When government agencies went digital, there was no one to answer the phone or attend to issues due to capacity constraints, office closures, and working from home. Information is no longer provided, and entrepreneurs do not have a point of contact, thus losing access to knowledge about procedures and requirements. This means that entrepreneurs need lawyers and experts to explain processes and

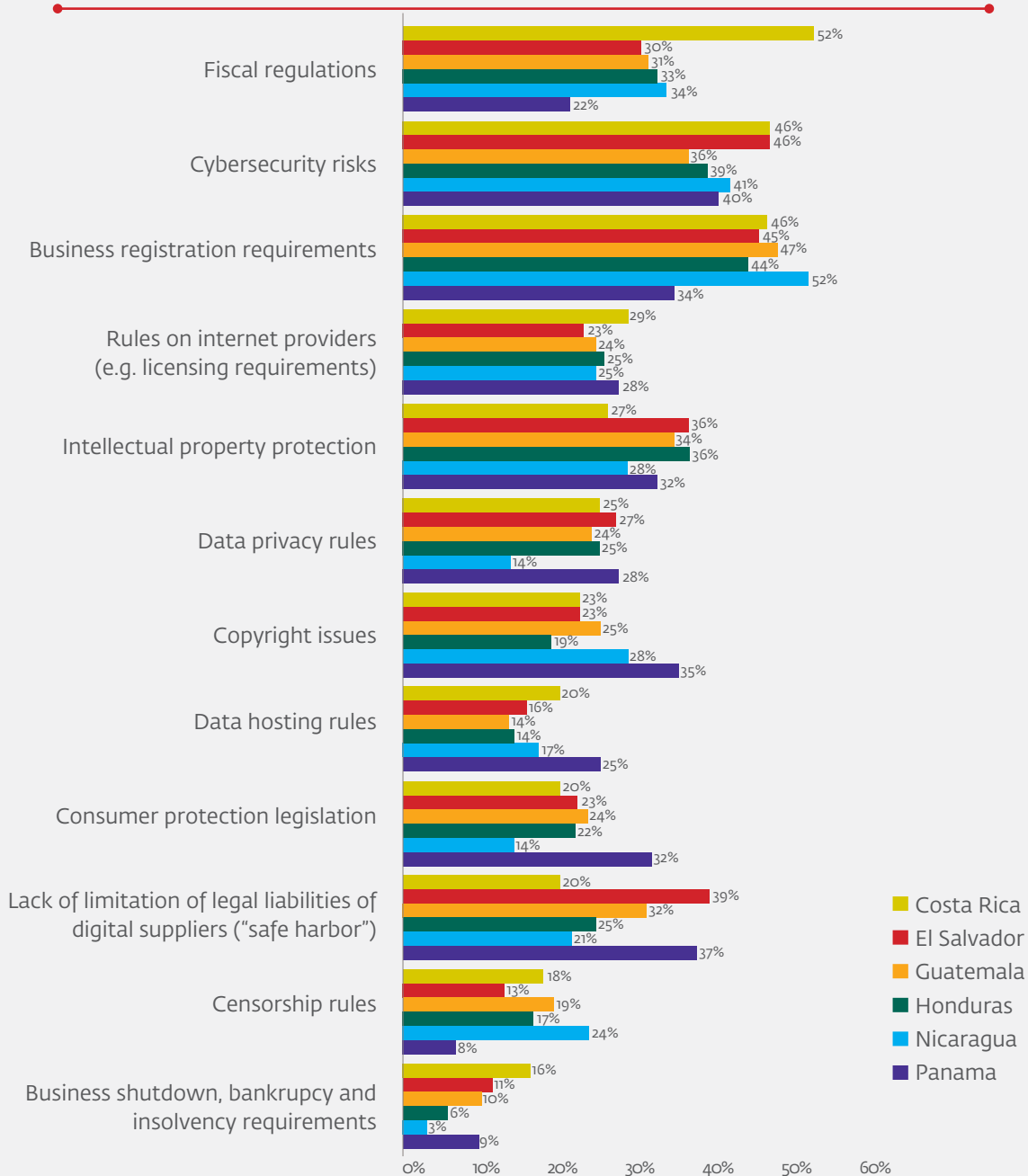
procedures to them, creating an additional cost that could be saved if the government had a web page containing all the information of interest.

Digital ID systems in Central America generally have room to improve. All Central American countries have implemented foundational digital ID systems with high levels of coverage to accelerate inclusive development and access to the formal economy. However, only Panama and Costa Rica have also implemented robust

digital authentication layers on top of their ID systems, allowing individuals to verify attributes and authenticate identities to access services remotely. Other countries, such as Honduras and El Salvador, are implementing structural reforms to revamp and modernize their ID systems, conceiving of them as a cornerstone of national digital transformation. Exchanging information between the public and private sectors is critical to implement an effective digital strategy and improve the quality and delivery of public services.

Figure 23.

PERCENTAGE OF MICRO AND SMALL FIRMS CITING BARRIERS TO DIGITAL SERVICES IN THEIR COUNTRY



Source: Digital Technology Support Survey IFC 2021.

ACCESS TO FINANCE

Access to finance is one of the main issues mentioned by both SMEs and tech start-ups.

SMEs listed acquisition cost, lack of information on available equipment, and access to finance as the top barriers to digitalizing their processes (Box 4). Many of the requirements for access to finance necessitate that companies have been operating for a long time and have assets to back up their loans. Another major limiting factor is the informality of the economy—small entrepreneurs are not able to formalize quickly and meet all the requirements for a loan. Also, interest rates are usually high for entrepreneurs. Having access to more resources gives greater access to new technologies, in addition to allowing their rapid and early adoption to increase productivity. During the pandemic, there was an opportunity to reestablish credit by lowering interest rates with banks through relief programs, but access was complicated.

Most digital start-ups need capital rather than debt to grow, but the market for seed, venture, and private equity funds in Central America is underdeveloped. The ecosystem value of technology-based start-ups in Central America is estimated to be USD 319 million (USD 71 million raised), about 0.14 percent of the value of the Latin American and Caribbean total ecosystem of USD 221 billion (Peña

2021). Guatemala's ecosystem is valued at USD 200 million (USD 40 million raised), Costa Rica at USD 64 million (USD 13 million raised), El Salvador at USD 37 million (USD 14 million raised), Honduras at USD 2 million (USD 1 million raised), and Panama at USD 16 million (USD 3 million raised) (Peña 2021). However, only 15 percent of innovators seeking equity find investors in the first 12 months (GALI 2021). A fragmented Central American market with very few active players also leads to smaller projects. Fundraising ventures represent a third of the average project size in Latin America, as shown in a recent survey on accelerator programs (GALI 2021). Additionally, Costa Rican companies complained that there are still no clear regulations for structuring venture capital. Honduran companies highlighted significant risks associated with the legal framework. For instance, the Commercial Code does not include some critical commercial instruments (such as convertible notes, warrants, stock options, and restricted stock). Guatemala has a very solid banking system, but regulations prevent accepting the high levels of risk commonly found with highly innovative firms. El Salvador needs to improve its commercial code to include more protection for minority investors.

The region is beginning to showcase success stories of digital entrepreneurs that accessed private equity to support growth, but most incubation and acceleration programs lack the capacity to guide

Box 4.

THE CASE OF THINK DIGITAL ACADEMY

A young Honduran couple founded Think Digital Academy in 2012 to provide digital education for small and medium companies. Initially, the company operated as a franchise of the Digital Marketing Institute, but they now create their own content adapted to the needs and growing demand of the Central American market. Think Digital has taught more than 250 courses on digital commerce topics including digital strategy, social media communication, political marketing, and digital transformation mindset. The demand for international expertise has led the company to pursue partnerships with organizations such as HubSpot, Google, and other global providers of digital education. Their primary clients are commercial banks, the Honduran Tourism Institute, and enterprise development programs. Serving clients with a regional presence has allowed Think Digital to grow its markets regionally by delivering content through a digital platform. The main obstacle faced by Think Digital Academy has been the lack of trust in digital service providers in Honduras. Another obstacle faced by Think Digital Academy has been the lack of capital to continue expanding its services. It wasn't until 2019 that Think Digital obtained seed capital from a private investor who believed in their business model. This capital allowed the company to standardize its operation, improve the content of its courses, expand marketing, and upgrade classroom infrastructure (physical and digital). COVID-19 increased demand for digital skills and digital marketing services, and Think Digital adapted its systems to deliver online courses and expanded its outreach beyond Tegucigalpa, the capital city. The challenge during this period was to maintain working capital due to the difficulties that MSME clients had with paying during the pandemic.

start-ups in the process of linking and selling their ideas to capture private equity. One good example of a success story that has expanded to different countries of Central America is Hugo App (Box 5). Many programs provide services that support businesses through early stages, but mainly in terms of management training. Only a few programs support start-ups through early-stage financing. Incubators and accelerators in the region need to strengthen their roles in supporting start-ups through the “de-risking” phase and prepare them to attract and receive equity from venture capital and angel investors. In addition to funding, these investors can also bring technology transfer, access to markets, and industry experience.

LOCAL DEMAND AND ACCESS TO MARKETS

Demand for digital services is increasing in Central America, but lack of innovation in key industry sectors and poor connectivity in rural areas constrain local demand from consumers and businesses. COVID-19 triggered an increased use of digital services, mainly for e-commerce, digital communications, and electronic payments. However, the digital transformation of MSMEs is limited. Digital services can help boost the productivity of the traditional agribusiness and light manufacturing sectors, which have lower productivity. Larger firms

report the use of advanced technologies such as artificial intelligence, but SMEs report that they are primarily using technology for digital marketing and communications. Connectivity, education, lack of trust, and other socioeconomic factors limit consumers' and businesses' demand for digital services. Although mobile penetration is high (above 100 percent penetration) in most countries, mobile broadband subscriptions and fixed broadband penetration are below regional benchmarks in Guatemala and Honduras (ITU 2020). El Salvador, Guatemala, and Honduras are among the Latin American and Caribbean countries with the lowest quality of connectivity in rural areas. Between 71 percent and 89 percent of rural populations lack access to high-speed connectivity (Ziegler et al. 2020).

There are substantial opportunities for international market expansion of digital services within Central America and internationally, yet there is a limited link between the supply of and demand for digital products and services. Over 60 percent of firms in Costa Rica, El Salvador, and Guatemala and over 50 percent of firms in Honduras, Nicaragua, and Panama identify lack of information about potential customers as the main barrier to expanding to new markets. This lack of data points to a need for better information sharing and matchmaking between these suppliers of digital services and technologies and their potential customers who report

Box 5.

THE CASE OF HUGO TECHNOLOGIES—REGIONAL EXPANSION THROUGH GLOBAL VENTURE CAPITAL INVESTORS

Founded in 2017 by three Salvadoran technology entrepreneurs, Hugo App developed a mobile application for food delivery that has reached over one million downloads in El Salvador and is expanding to other countries in the region. By 2020, Hugo had become the first Central American “unicorn,” reaching over USD 50 million in sales and valued at over USD one billion. Hugo connects food services and consumers through its mobile application, allowing for digital payments, efficient logistics, and tracking for home and office deliveries. Its founders had technology and financial backgrounds and business networks that allowed them to raise capital from international technology investors to fund regional expansion. Private investors have provided not only funds but also their expertise and strategic vision to adapt the business model to Central American markets. Despite its remarkable growth, which accelerated during COVID-19, Hugo App still encounters barriers to expanding its markets and operations. One of the biggest hurdles is the lack of streamlined payment processing platforms that integrate all services in the region. The processes are still cumbersome. The lack of digital economy regulations does not provide sufficient certainty and transparency. It keeps large global technology and financial innovation providers from entering the region, which could enable a smoother transition to the digitalization of payments. Finding the right talent—with technology skills and an entrepreneurial mindset—has also been a challenge. Yet, the rapid growth of digital delivery platforms in the region has become an increasingly important source of employment for young software developers and digital markets, as well as for less-skilled workers such as motorcycle drivers.

challenges learning about and identifying technologies and solutions suitable for their needs. Digital freelancers in El Salvador, for example, with the right skills (programming and English) are increasingly providing services through global platforms such as Upwork and Freelancer.com. A more dynamic ecosystem will absorb local talent to boost the digital transformation of regional industry clusters, promote investment, and generate jobs.

HUMAN CAPITAL

Central American digital service providers face challenges in recruiting talent due to perceived workforce skills gaps and a lack of good local training programs and educational systems.

Salvadorean companies perceive that there are very talented people in the country, but there are limitations in terms of their cultural background with respect to entrepreneurship and innovation. Guatemalan companies express that they do not have access to more professional human capital because they cannot compete with larger companies in terms of pay scales. Another challenge is the quality of training. It is important to have standards and a generic curriculum, as well as certified consultants to standardize training methodologies for entrepreneurs. Costa Rican companies express that entrepreneurs have little knowledge or training on management, finance, investors, etc. Therefore, they do not know at what stage their venture should be to be attractive to an investment fund. One of the biggest barriers for the academic sector is the approval time required to update the curriculum for a particular degree, which makes it hard to adapt to global standards. Approval of new programs and careers can take up to 4 years. Honduran companies express that their main challenge for local firms to have access to professionals with technological skills is the system of primary, secondary, and higher education. This study identified programs that stand out in developing

digital skills among youth and children. In El Salvador, Kodigo (a private NGO program) and Youth in the Cloud (supported by Amazon Web Services) deliver short-term certificates to train youth in specific ICT skills that are in high demand in the global market. In Costa Rica, the Ministry of Public Education implements Techno@prender to introduce digital skills in the general education system.

LACK OF PUBLIC POLICY SUPPORTING THE TECHNOLOGY INDUSTRY

Public policy does not favor the Central American technology industry. In many Central American countries, innovation is punished. There are no dynamic models that allow innovation and provide accompaniment, financial support, and technology transfer so that companies can reach a point where they can access credit and support to move forward with autonomy. In Honduras, for example, technology is not considered an industry, despite the fact that there is a technology industry association with more than 200 members. There is no measurement in the national accounts of the Central Bank of what the technology industry contributes to the economy, which hinders several public policy issues that are oriented toward digital entrepreneurship. Also, even though digitalization is a priority due to COVID-19, there is no public policy to guide the need for digitalization. Costa Rican companies mention that it is difficult for start-ups to access public contracts. Without having three years of positive sales records, many cannot access public sector contracts. This causes innovations to be discarded.





06 □

**POLICY
RECOMMENDATIONS**

Approve and adopt a regional digital business transformation strategy for MSMEs that includes e-commerce and other ICTs to boost productivity, innovation, and access to markets. The strategy should contain at least: (a) promotion of digital technologies that can boost high potential ecosystems' productivity, including regional electronic commerce platforms and marketplaces that integrate regional offers of products and services and that can be specialized by market segments; (b) promotion of regional access to finance for digital transformation and innovation of MSMEs; (c) provision of software by regional organizations to micro and small companies to help them have a more competent back and front office to be able to grow; (d) improvement of procedures and regulations for air cargo-expedited shipments; (e) promotion of low-cost electronic payment mechanisms including an enabling environment; (f) revision of specific regulations for the digital sector and promotion of regional integration or harmonization, including e-commerce, banking laws, cyber security, data protection, competition policies, consumer protection, and intellectual property laws; (g) promoting linkages between supply of and demand for technology; and (h) increasing MSMEs' digital transformation skills, including marketing and sales to regional markets, business-to-business (B2B), and business-to-government (B2G). MSMEs need more capacity to implement online channel management platforms, sell to foreign markets, and use digital tools. Regional integration should particularly focus on facilitating e-commerce exchanges and digital payments to create economies of scale in Central America. Suggested responsible agencies: CENPROMYPE and COMIECO. Time frame: Approval-Short term; Adoption-Medium term.

Promote coordination among government, organizations, and donors to follow clear priorities based on specific local ecosystems to support start-ups, especially digital start-ups. Because there are several institutions and public programs providing business development services with different methodologies and approaches to support entrepreneurship, it is important to promote coordination among government, organizations, and donors to follow clear priorities based on specific local ecosystems. Governments could create technology centers in coordination with incubators/accelerators to offer extension services, laboratories for testing and prototyping in geographic areas where there are local high potential entrepreneurship ecosystems. For tech start-ups, it is also important to review existing

incubation and acceleration programs to see whether there is substantial unserved demand, reorienting such programs to the needs of the local ecosystems. For example, it is important to restructure programs to support early-stage businesses and create more linkages between the supply of and demand for technology. CENPROMYPE can promote a regional platform for digital start-up programs and digital transformation programs for MSMEs. This tool can promote innovation in the design, implementation, and evaluation of enterprise development programs by sharing impact evaluations, georeferencing MSME support programs, mapping areas of support, and showcasing best practices, effective methodologies, and success stories. Suggested responsible agencies and time frame: CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, innovation agencies. Medium term.

Provide technical assistance to SMEs on technologies available through innovation research centers and technology laboratories, business associations, alliances with global technology providers, and the regional SBDC network, allowing companies to test services and technologies at little cost, and promote linkages between developers and firms that demand technology. Firms tend to learn about new technologies from their peers and business associations, which suggests that business associations and SBDCs could have more permanent "digital transformation hubs" where firms can learn about technologies and digital transformation processes and their peers' experiences with technology adoption. Such digital transformation hubs would enable new connections between firms that seek to identify digital technology solutions and providers that seek to identify new clients. Such a "tech match" could also be regionalized to enable Central American digital service providers to display their services and technologies to potential B2B customers across the region. Another solution could be virtual tech fairs and demo sessions with local and international solutions providers. Regionalizing this activity could make it attractive for international providers to reach firms at scale. Suggested responsible agencies and time frame: CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, innovation agencies through business associations, and SBDCs. Short term.

Provide technical assistance programs to help SMEs digitalize their operations further. Buyers' demand for more effective service delivery prompted by COVID-19 could motivate firms to adopt

new technologies across their sales cycles, from procurement to financing and payments, and also prompt traditional providers like delivery services and financial services to digitalize their operations further. It is necessary not only to develop technological products and services but also to develop digital competencies for industries, such as manufacturing, agribusiness (agtech), and finance (fintech), that will help them do their work in the digital era. As various service providers digitalize, the public sector can encourage solutions such as open applications programming interfaces, open banking, digital identities, and blockchain to support interoperability of the various public and private service providers. Firm-specific approaches such as training and financing need to be complemented and couched in scalable ecosystem approaches that enable firms to access digital services easily and that avoid a setting where various services become “digital islands.” Suggested responsible agencies and time frame: CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, and innovation agencies through business associations, SBDCs, universities, and business schools. Medium term.

Create strong regional and national programs to improve the business environment and regulatory framework using e-government services and an observatory of good practices. This would have a number of aspects:

I. Various countries of Central America have promoted anti-red tape laws (leyes anti trámites), but they need to be rigorously implemented. It is also important to review and amend the laws and regulations that are affecting the business environment.

II. Especially taking into account the lessons that COVID-19 is teaching all countries, governments need to update many outdated laws that are obstacles to e-commerce and e-government. It is also important to review tax regulations and update them to adapt to the nature of digital transactions and the dynamism of technology.

III. In terms of facilitating formalization and closure, the important thing is not for the state to offer incentives but for it to make it easier for companies to operate. Such facilitation includes not imposing obstacles, so that opening and closing companies is easy, reducing experimentation costs. Uruguay has a type of company made for entrepreneurs, a mix between a corporation and a limited liability company, which does not ask for so many requirements, involves more people, and facilitates digital entrepreneurs and venture capital. If

governments want to support these ventures through tax incentives, it might be important to ensure that the laws for business conception allow for less formality and that the state can have some control of many businesses that are now informal and do not declare their sales.

IV. Payments digitization is essential for Central America’s digital sector. Central American MSMEs need low-cost electronic payment platforms that allow for business-to-consumer (B2C) and B2B transactions. Regional B2B payment platforms with low transaction costs should be promoted. The region can also draw on many useful international models to streamline and lower the costs of digital payments. One such example is xoom.com (a PayPal service), an instant, low-cost, cardless payment solution that works well with major banks and credit cards internationally.

V. Continue modernizing the regulatory framework for financial inclusion and innovation. This is required to allow for financial innovation start-ups to launch solutions to promote e-payments and access to finance for individuals and businesses under regulatory supervision and maintaining the stability of the financial system. Norms need to also allow for improved risk management and faster approval systems of loans by financial institutions. Countries also need to update their banking laws and commercial regulatory frameworks to include modern forms of debt, equity, and hybrid financing instruments, including protection for minority investors. Central American countries can also adopt fintech laws to formalize and promote alternative finance providers to support digitalizing firms with short- and longer-term loans and equity financing. It is essential to create the regulatory conditions for early-stage financing to develop through venture capital and crowdfunding.

VI. As data and electronic transactions are becoming more valuable to business processes, governments need to stay vigilant and provide certainty to investors and firms on the rules for the collection, storage, and use of data. Countries need to regulate aspects such as data protection, cybersecurity, and ride-sharing. As discussions continue in the multilateral economic system (OECD and WTO), and while bilateral trade agreements are revised, Central America would be well advised to observe how current regulations and trade agreements impact digital businesses and promote new regulations to promote investment, technology adoption, and access to foreign markets, regionally and globally. Finding a balance between regulating for trust and avoiding creating too much regulatory

uncertainty will be an important and challenging task for governments, policy makers, and regulators.

VII. As markets digitalize, competition regulators need to adapt competition policies to digital consumer protection. Competition regulators and consumer protection agencies both need to strengthen and update their capacities to respond to emerging threats.

VIII. Countries could also seek to create regional regulations to improve the business environment using the SICA framework.

IX. It would help to create a regional observatory of good practices to analyze, for each of the different options, what decisions and actions have been taken in order to move forward. It should be taken into account that each country has a different legal framework, but they have a problem in common: the need to advance in technological adoption and generate job opportunities.

Suggested responsible agencies and time frame: COMIECO, ministries of economy, financial system regulators. Medium term.

Promote e-government services, reducing unnecessary formalities and involving entrepreneurs in developing digital solutions for central government and municipal procedures.

To better allow for e-government progress, it is important to reduce unnecessary formalities and documents so as not to digitalize what does not add any value to the process or to the government controls. Another important aspect of e-government is to implement electronic signature laws. It is also important that governments create e-payment gateways for their services. Also, governments need to work on the interoperability of their services within the country and with other Central American countries. Central American countries could create mutual recognition of IDs to facilitate opening bank accounts and businesses and promote data transfer to facilitate migration while personal data is protected. All improvements in government services must be accompanied by educating entrepreneurs about online modalities. These improvements can be attained by linking government institutions' digital improvement needs with technology laboratories, accelerators, and freelance IT experts to develop solutions for government services through digital technologies. Connectivity, digital identifications, data management and use, blockchain, and other technologies can be adapted to resolve problems in public administration. Suggested responsible agencies and time frame:

e-government agencies and all government institutions. Medium term.

Establish a regional facility for digital transformation and create a differentiated credit policy for SMEs. Central American firms require more financing to adopt new technologies. The availability of such financing could also motivate more firms to consider technologies. Central American countries could create digital transformation funds that leverage existing government SME and technology funds and co-finance viable digital transformation projects with the target firms and private lenders and investors. The digital business transformation strategy should include the promotion of regional access to finance for digital transformation and innovation of MSMEs. Considering the significant growth and productivity gains that regional firms are gaining from technology adoption, this funding vehicle could well generate an important return to lenders and investors and, over time, become sustainable as a private sector-led vehicle. In addition, governments should create a differentiated credit policy for micro and small companies because they cannot comply with the requirements that banks demand. Central American countries can also adopt fintech laws to formalize and promote alternative finance providers that can support digitalizing firms with short- and longer-term loans and equity financing. This facility could be complemented with technology adoption or innovation grant programs to help firms digitalize and transform operations to meet post-COVID demands, among other needs. New grant and voucher programs could be developed. For instance, governments could provide small grants for digitalization, e-commerce adoption, or transformation of any of their operational processes. Grant programs could be combined with business advisory services to maximize impact. Suggested responsible agencies and time frame: Central American Bank for Economic Integration (CABEI) with support from IFC. Short term.

The region can also catalyze early-stage financial support, venture capital, and debt instruments to fit the needs of digital entrepreneurs. The objective is to foster the entrepreneurship ecosystem by creating financial tools to fund the early stage—from idea creation to a fundable business. The facility could include a first-loss-guarantee mechanism to reduce the risk to debtors (financial institutions) and equity investors. It would thereby also reduce the costs and requirements for entrepreneurs, such as sales and financial performance, time in business, and tangible assets. Innovative financial instruments can also include hybrid

debt/equity participating bonds, profit-participating loans, crowdfunding, and asset-based finance like purchase order finance and factoring. Transformational entrepreneurs could also benefit from mezzanine financing instruments, falling along the spectrum between pure equity and pure debt. This facility can explore new fund structures, moving from closed-ended funds to more flexible time horizons, lower management fees, higher carried interest, and broader exit options. Ultimately, it should target funds and their instruments to start-ups' needs, aiming to fill financing gaps and avoid crowding out private investments. It should consider the optimal structure of legal and economic incentives and guarantee that access to capital is based on business potential and performance (Tradros and Horton 2018, 37). Suggested responsible agencies and time frame: CABEL, with support from IFC, commercial banks, financial institutions, and technology firms, can act as a catalyst to boost access to finance for digital entrepreneurs. Medium term.

Strengthen the quality of incubators and accelerators, promoting start-up-focused, strategic, and financially robust programs.

Ecosystem support programs should strive to have active private sector participation at the core of their offerings (Tradros and Horton 2018, 38) and center their actions on what start-ups need in their particular contexts. Promote robust strategic and financial approaches among world-class incubators and acceleration programs while reinforcing broad programs to upgrade MSMEs' digital and business skills. Public and private initiatives can agree to develop investment standards that focus on the financial returns and maximize the economic and social impact of enterprise development efforts. Supporting facilities for incubators/accelerators can develop local entrepreneurs. One good example is IFC Startup Catalyst, which is a facility through which to invest in a portfolio of incubators, accelerators, seed funds, and similar vehicles and structures (collectively referred to as seed-stage funding mechanisms—"SSFMs") through equity and quasi-equity instruments. These SSFMs, in turn, support entrepreneurs and their early-stage companies across IFC's target markets. Suggested responsible agencies and time frame: From a regional perspective, CENPROMYPE can promote best practices and links to world-class incubation and acceleration models, as well as a regional database of certified digital entrepreneurship mentors. National MSME and science and innovation agencies can promote standards and quality certifications for technology incubators

and accelerators and support strengthening and linking private and NGO programs to other key ecosystem actors. Medium term.

A holistic approach to supporting entrepreneurship is needed, which links funding to pipeline development.

Fostering the supply side of the business angel or venture capital ecosystem is not enough to guarantee access to external sources of finance that can support experimentation and innovation. The investment readiness or quality of the pipeline is also crucial. Investment readiness programs are important to provide individualized training, mentoring, coaching, and other services to overcome these constraints. Improving the effectiveness of these programs means working closely with investors to understand their requirements and tailoring them accordingly (Tradros and Horton 2018, 38). Suggested responsible agencies and time frame: Private incubators and accelerators. Medium term.

Governments, accelerators, universities, and business associations should promote linkages between digital service providers and national, regional, and international industries.

It is important to create or extend incentives to strengthen collaboration and linkages between demand for and supply of technology. A digital business transformation strategy and marketplace platform could be established to match industry needs and digital technology providers. This would accelerate the process of developing, adapting, transferring, and scaling up technologies. The linkages could support digitization initiatives geared toward strategic repositioning of high-employment sectors (e.g., maquila apparel to sustainable fashion, or capacity building for social media marketing and e-commerce for retail). It could deliver business solutions that help transform SMEs, diversifying their products, accessing local, regional, and international markets, avoiding physical contact, and addressing entrepreneurship challenges in other sectors. Suggested responsible agencies and time frame: CENPROMYPE, ministries of economy/MIPYME agencies, ministries of science and technology, innovation agencies through business associations and small business development services (SBDCs). Medium term.

Export promotion agencies in the region and embassies abroad can play a useful further role in promoting digital service providers in world markets and with large buyers.

Such Latin American countries as Colombia, Chile, and Costa Rica have successfully attracted foreign business customers to procure digitally deliverable services across sectors, including gaming,

animation, customer service, and BPO. Costa Rica has been extraordinarily successful by global standards in increasing its digitally deliverable services exports in the past few years, in part thanks to local companies finding new customers and in part by attracting large tech companies such as Amazon and Microsoft to locate operations in Costa Rica. These players are now also helping groom local technology talent and creating useful knowledge spillovers in the economy, including for small digital services firms. Other Central American countries could borrow from this playbook, for example, by leading trade missions to major service industry fairs, bringing procurement leads of global companies to the region to meet with local suppliers, and improving the investment climate for digital services. Accelerators could play an important role in this. There are many hubs and entities in various countries, but coordination in the interior of the country should be expanded. Accelerators could promote platforms or mechanisms to link innovators with the needs of the industry, where industries demand, and entrepreneurs can offer. In addition, chambers of commerce could also play a crucial role in linking service providers with industries. Suggested responsible agencies and time frame: export promotion agencies. Medium term.

Update the education and vocational curricula to the needs of the digital industry, promote academy-industry partnerships, and increase the participation of women in training programs. It is important to facilitate code development, managerial and financial skills, crisis recovery, adaptation, and digitalization in schools and universities for both men and women, promoting academy-industry partnerships. Although survey data suggests no major difference in the adoption of technologies between men and women once women reach a certain level of digital skills, micro-level firm data shows fewer women own businesses in the digital sector, and fewer women work in high tech and digital services. Increasing the participation of women in training programs and supporting women digital entrepreneurs can enhance women's role in the digital sector. Creating awareness of the importance of gender considerations in program design among governments and supporting organizations is critical. Developing targeted industry-specific programs that build the capacities of women entrepreneurs in technology and managerial skills has been demonstrated to promote the success of women. Showcasing examples and success stories of women leaders builds the confidence of female entrepreneurs. Once women acquire digital and managerial skills, leadership is vital to increasing female entrepreneurship. Mentoring and

coaching can promote women's empowerment and leadership. Programs such as IFC We-Fi in the Middle East and North Africa, United Nations E-Women, UNCTAD She Trades E-commerce Programs, and TFO Canada provide best-practice interventions that aim to boost female digital entrepreneurship. Suggested responsible agencies and time frame: Ministries of education together with innovation agencies, ministries of economy, women's development agencies, universities, and business schools. Medium term.

Central America should consider formulating public policy to support innovation in the technology industry. First, technology development should be considered an industry in the national accounts to allow measurements and policy-oriented actions. Second, it is important to promote coordination among government, supporting organizations, and donors to define priorities across local ecosystems and identify critical gaps. From this analysis, it would be essential to integrate municipalities and local organizations in planning and delivering technical assistance to local firms and identifying potential areas to harmonize policies and regulations to facilitate the growth of innovative sectors, such as fintech or application platforms. Third, innovation should be rewarded, for instance, by allowing entrepreneurs to make mistakes through providing for businesses to have flexible legal constitutions so that entrepreneurs can formalize and even close a business quickly without excessively burdensome requirements. Entrepreneurs can also have more flexible requirements for small public contracts. Fourth, it is also important to promote the adoption of standardized monitoring and evaluation systems for entrepreneurship programs. Making firm-level data more widely available with comparable indicators for entrepreneurship at the national and sub-national levels across Central America would significantly help the delivery of evidence-based policy. Suggested responsible agencies and time frames: ministries of economy and innovation agencies. Medium term.

Provide transformation awards. Providing annual digital transformation awards for Central American firms that have translated technologies into growth could motivate more firms to test new technologies. These awards could be sponsored by large technology companies, regional governments, and Central American Integration System institutions. Suggested responsible agencies: CENPROMYPE, ministries of economy and innovation agencies, and business associations, such as chambers of industry and chambers of commerce. Time frame: Medium term.

ANNEX A

LIST OF PROGRAMS THAT SUPPORT THE ENTREPRENEURSHIP ECOSYSTEM IN COSTA RICA, EL SALVADOR, GUATEMALA, AND HONDURAS

A.1 TOTAL LIST OF PROGRAMS

Number of Programs Identified	241
Number of Survey Respondents	118
Digital Technologies Incubation Programs (CR: Parque Tec, Tec Emprende Lab, AUGÉ, CEI-UCI, CCCR; GT: Campus Tec, Progreso X, UVG, USAC; HN: HDC, HUB UNITEC)	11

Source: Consultations with the Ministries of Economy and MSME agencies.
 Note: Inventory of institutions gathered during IFC Digital Entrepreneurship Diagnostic. AUGÉ=Agencia Universitaria para la Gestión del Emprendimiento de la Universidad de Costa Rica. CEI-UCI= Centro de Emprendimiento e Innovación de la Universidad para la Cooperación Internacional. UVG= Universidad del Valle de Guatemala. USAC= Universidad de San Carlos. UNITEC= Universidad Tecnológica de Honduras.

- Instituto Nacional de Fomento Cooperativo (INFOCOOP)
- Instituto Nacional de la Mujer (INAMU)
- MICIT (Ministerio de Innovación, Tecnología y Telecomunicaciones)
- MEIC (Ministerio de Economía, Inversión y Comercio)
- Ministerio de Agricultura
- Ministerio de Ambiente, Energía y Telecomunicaciones (MINAE)
- Ministerio de Trabajo y Seguridad Social
- PROCOMER (Costa Rica Trade Promotion Agency)
- Correos de Costa Rica (Costa Rica National Postal Services)

A.2 COSTA RICA: LIST OF PROGRAMS THAT SUPPORT ENTREPRENEURSHIP

Number of Programs Identified	54
Number of Survey Respondents	20
Digital Technologies Incubation Programs (Parque Tec, Tec Emprende Lab, AUGÉ, CEI-UCI, CCCR)	5

Source: Consultations with the Ministry of Economy, Investment and Commerce (MEIC), Ministry of Communication, Innovation and Technologies (MICIT) Registry of Incubators of New Technology-Based Firms.
 Note: Inventory of institutions gathered during IFC Digital Entrepreneurship Diagnostic. AUGÉ=Agencia Universitaria para la Gestión del Emprendimiento de la Universidad de Costa Rica. CEI-UCI= Centro de Emprendimiento e Innovación de la Universidad para la Cooperación Internacional.

PRIVATE ORGANIZATIONS AND NGOS

- Asociación Empresarial para el Desarrollo (AED)
- Asociación GS1 Costa Rica
- Costa Rica Innova (CRINNOVA)
- Cámara de Comercio de Costa Rica (CCCR)
- Cámara de Exportadores de Costa Rica (CADEXCO)
- Cámara de Industrias (CICR)
- Centro Nacional de Producción más Limpia (CNP+L)
- Camara Nacional de Comerciantes Detallistas y Afines (CANACODEA)
- Camara de Textileros Costarricenses (CATECO)
- Cámara de Tecnologías de Información y Comunicación- CAMTIC
- Centro de Emprendimiento CEI-UCI
- Colegio Universitario de Cartago (CUC)
- Consejo Nacional para la Investigación Científica y Tecnológica (CONICIT)

GOVERNMENT PROGRAMS:

- Banco Nacional de Costa Rica
- Banco Popular y de Desarrollo Comunal (BPDC)
- Instituto Costarricense de Turismo
- Instituto Nacional de Aprendizaje
- Instituto Costarricense de Electricidad (ICE)

14. Tecnológico de Costa Rica
15. Cooperativa de Servicios a Mujeres Productoras y Empresarias (COPEMUPRO)
16. Fundación Centro de Gestión Tecnológica e Informática Industrial (CEGESTI)
17. Fundación Omar Dengo (FOD)
18. Fundación para el Desarrollo Sostenible de la Pequeña y Mediana Empresa (FUNDES)
19. Grupo Financiero IMPROSA (GFI)
20. Instituto Nacional de Biodiversidad (INBIO)
21. Instituto Nacional de Seguros (INS)
22. Instituto de Normas Técnicas de Costa Rica (INTECO)
23. Junta Administradora Portuaria del Desarrollo de la Vertiente Atlántica (JAPDEVA)
24. ParqueTec
25. Red Costarricense de Organizaciones para la Microempresa (REDCOM)
26. Sistema de Banca para el Desarrollo (SBD)
27. Zona Económica Especial Cartago (ZEE)

FINANCIAL INSTITUTIONS

1. Sistema de Banca para el Desarrollo (SBD-public)
2. Banco Crédito Agrícola de Cartago (BanCrédito)
3. Banco Improsa
4. Banco Promerica
5. Bac San José (BAC)
6. Bolsa Nacional de Valores (BOLSACR)
7. Financiera DESYFIN S.A.
8. Grupo Financiero IMPROSA (GFI)

ACADEMIC INSTITUTIONS AND UNIVERSITIES

1. Instituto Tecnológico de Costa Rica (ITCR)

2. Universidad Técnica Nacional (UTN)
3. Colegio Universitario de Limón (CUNLIMON)
4. Universidad Católica de Costa Rica (UCATOLICA)
5. Universidad de Costa Rica (UCR)
6. Universidad de San Marcos (USAM)
7. Universidad Estatal a Distancia (UNED)
8. Universidad Latinoamericana de Ciencia y Tecnología, (ULACIT)
9. ULEADS (LEAD University)
10. Universidad Nacional de Costa Rica (UNA)
11. Universidad Técnica Nacional (UTN)
12. Tecnológico de Costa Rica- TEC Emprende LAB

A.3 EL SALVADOR: LIST OF PROGRAMS THAT SUPPORT ENTREPRENEURSHIP

Number of Programs Identified	59
Number of Survey Respondents	30
Digital Technologies Incubation Programs	-

Source: Ministry of Economy, CONAMYPE, BANDESAL, GEM Report 2017.
Note: IFC Digital Entrepreneurship Diagnostic.

GOVERNMENT PROGRAMS:

1. Secretariat of Innovation (Secretaría de Innovación)
2. CONAMYPE (National Commission for Micro and Small Enterprises)
3. Secretariat of Innovation (Secretaría de Innovación)
4. Ministry of Agriculture and Livestock
5. Ministry of Economy (MINEC)
6. Ministry of Tourism / CORSATUR
7. PROESA (Investment and Export Promotion Program)
8. National Institute for Youth (INJUVE)
9. INSAFORP (National Institute for Professional Training)
10. Banco de Desarrollo de El Salvador (BANDESAL)

11. Banco de Fomento Agropecuario (BFA)
12. Ministry of Educación (MINED)
13. Ministry of Foreign Affairs (MRREE)
14. Ministry of Labor and Social Prevention (MTPS)
15. Fondo de Inversión Social para el Desarrollo Local (FISDL)
16. Fondo Solidario para la Familia Microempresaria (FOSOFAMILIA)

PRIVATE ORGANIZATIONS AND NGOS

1. ADEL Morazán (Local Development Association Morazán)
2. ASI - Salvadorean Manufacturers Association
3. B-Peace El Salvador
4. Banco Hipotecario
5. CASATIC (Camara Salvadoreña de Tecnología de información y Comunicaciones)
6. Chamber of Commerce
7. Fondo Empresarial para la Acción Social (FUNDEMÁS)
8. Fundación Salvador del Mundo (FUSALMO)
9. Fundación Gloria Kriete - KODIGO
10. Fundación Salvadoreña para el Desarrollo (FUSADES)
11. ITCA – FEPADE (Instituto Tecnológico Centroamericano – Fundación Empresarial para el Desarrollo)
12. Código - Fundación Gloria Kriete
13. Joven360
14. Vital Voices
15. El Mercadito
16. Impact Hub
17. Ashoka
18. Emprénde Inversiones
19. Pomona Impact
20. ACDMYPE (Asociación de Centros de Desarrollo Empresarial de la Micro y Pequeña Empresa).

21. Glasswing
22. Hecho en Casa
23. HUB 170
24. Impact HUB
25. INNBOX
26. Innogen Capital
27. INSERT YAWAL
28. ITCA (Instituto Técnico Centroamericano)
29. ITCHA (Instituto Tecnológico de Chalatenango)
30. Seeds Community - SNDBX
31. World Vision

ACADEMIC INSTITUTIONS AND UNIVERSITIES

1. Escuela Superior de Economía y Negocios
2. Universidad Centroamericana José Simeón Cañas
3. Universidad Dr. José Matías Delgado
4. Universidad Don Bosco
5. Universidad Evangélica de El Salvador (UES)
6. Universidad Gerardo Barrios
7. Universidad Francisco Gavidia
8. Universidad Monicá Herrera

MULTILATERAL ORGANIZATIONS AND DONORS

1. Japan International Cooperation Agency (JICA)
2. Banco Interamericano de Desarrollo (BID)
3. United States Agency for International Development (USAID)
4. Swisscontact
5. International Organization for Migration (OIM)
6. International Labor Organization (ILO)

A.4 GUATEMALA: LIST OF PROGRAMS THAT SUPPORT ENTREPRENEURSHIP

Number of Programs Identified	64
Number of Survey Respondents	41
Digital Technologies and Innovation Incubation Programs: Campus Tec, Universidad del Valle de Guatemala, Progreso X, University of San Carlos	4

Source: Consultations with the Ministry of Economy Unit of Entrepreneurship.
Note: IFC Digital Entrepreneurship Diagnostic.

GOVERNMENT PROGRAMS

1. BANRURAL (Banco de Desarrollo Rural)
2. Centro Municipal de Emprendimiento - CME, MUNI Guatemala
3. MINECO Programa de Promoción Comercial
4. Universidad San Carlos de Guatemala Facultad de Agronomía – USAC
5. Universidad San Carlos de Guatemala Facultad de Ciencias Económicas – USAC
6. Universidad San Carlos de Guatemala Facultad de Ingeniería – USAC
7. Dirección General de Investigación – USAC
8. Incubadora Municipal de Empresas - Villa Nueva
9. INTECAP (Instituto Técnico de Capacitación)
10. National Secretariat of Science and Technology (SENACYT)
11. MINECO Centros de dinamización económica -
12. Ministerio de Agricultura, Ganadería y Alimentación (MAGA)
13. National Competitiveness Program (PRONACOM)
14. Ministry of Education (MINEDUC)
15. Ministry of Labor and Social Prevention (MINTRAB)

16. Guatemalan Institute of Tourism
17. Ministerio de Economía - Unidad de Fortalecimiento al Emprendimiento
18. Ministerio de Agricultura
19. MINECO Programa de Articulación Productiva -

PRIVATE ORGANIZATIONS' PROGRAMS AND NGOS

1. Aceleremos Guate
2. AGEXPORT: Asociación Guatemalteca de Exportadores
3. ANDE (Aspen Network of Development)
4. Asociación de Emprendedores de Guatemala
5. ASOPYME
6. BANTRAB (Banco de los Trabajadores)
7. BS Legalis
8. Cámara de Comercio de Guatemala
9. Cámara de Comercio Guatemalteco Americana - AMCHAM
10. Cámara de Industria de Guatemala
11. Campus Tecnológico de Guatemala - Campus Tec-
12. CECI - Centro de estudio y de cooperación internacional
13. Chamba Coworking
14. Chapines Chispudos
15. Emprende 502
16. Emprende U
17. EMPRENDEDORES GT
18. Enactus Guatemala
19. FHL CONSULTING
20. Foro de Emprendedoras Gt
21. Alterna
22. Fundación Génesis Empresarial
23. Fundesa

24. Go by Consortium
25. Good Neighbors
26. Guatetrending
27. HEIFER International
28. How Fun Studio
29. Impacto Empresarial
30. JUNKABAL
31. KINAL
32. Universidad Francisco Marroquin - Kirzner Center for Entrepreneurship
33. LEGALSA
34. Mercy Corps
35. Mejoremos Guate
36. Multiverse
37. NEGU
38. Plan Internacional
39. Pomona Impact
40. PRODETUR (Promotora para el Desarrollo Turístico)
41. Progreso X
42. Red de Instituciones de Microfinanzas de Guatemala, REDIMIF
43. Red Nacional de Grupos Gestores
44. Root Capital
45. She Works
46. Semilla Nueva
47. Socialab
48. Swisscontact
49. Training Day Grupo Veraz
50. TECHNOSERVE
51. Tigo Business
52. TGB Consulting

53. Transformaciones del Caribe SA
54. Voces Vitales
55. Walt Whitman American Center IGA
56. Yuxtem
57. Academia
58. Universidad del Valle de Guatemala
59. Universidad Internaciones -UNI-
60. Universidad Rafael Landívar

A.5 HONDURAS: LIST OF PROGRAMS THAT SUPPORT ENTREPRENEURSHIP

Number of Institutions Identified	64
Number of Survey Respondents	27
Digital Technologies Incubation Programs: Honduras Digital Challenge; HUB UNITEC	2

Source: Consultations with SENPRENDE.
Note: IFC Digital Entrepreneurship Diagnostic.

GOVERNMENT PROGRAMS

1. IHCIETI – Instituto Hondureño de Ciencia, Tecnología e Innovación)
2. BANHPROVI – Banco Hondureño para la Producción y la Vivienda
3. Economía Naranja
4. Credito Solidario
5. ARSA – Agencia de Regulación Sanitaria
6. Instituto de la Propiedad
7. Alcalde Municipal de San Pedro Sula
8. Alcaldía Municipal de Tegucigalpa
9. Secretaria de Desarrollo Económico
10. Secretaria de Turismo
11. Secretaria de Trabajo y Seguridad Social

12. Comision Nacional de Bancos y Seguros (CNBS)
13. Honduras Central Bank (BCH)
14. Congreso Nacional HN
15. ONCAE (Oficina Normativa de Contratación y Adquisiciones)
16. Consejo Nacional de Inversiones
17. Secretaría de Agricultura (SAG)
18. Instituciones Publico/Privada
19. Central American Bank for Economic Integration

PRIVATE ORGANIZATIONS' PROGRAMS AND NGOS

1. Cámara de Comercio e Industrias de Tegucigalpa
2. Bazar del Sábado
3. Cámara de Comercio e Industrias de Cortes
4. FUNDER – Fundación para el Desarrollo Rural
5. FEDECAMARA – Federación de Cámaras de Comercio de Honduras
6. COHDESSE Consejo Hondureño del Sector Social de la Economía -
7. Asociación Nacional para la Mediana y Pequeña Empresa (ANMPIH)
8. Consejo Hondureño de la Empresa Privada (COHEP)
9. VOCES VITALES
10. IMPACT HUB
11. Red de Centros de Desarrollo de Honduras
12. CDE-Comayagua (Centro de Desarrollo Empresarial)
13. CDE-Golfo de Fonseca
14. CDE-Olancho
15. CDE-Coordillera Nombre de Dios
16. CDE-Santa Bárbara
17. CDE-Lempa
18. CDE-Occidente

19. CDE-Mosquitia
20. CDE-El Paraiso
21. CDE-Lean
22. CDE-12 Centro
23. CDE-Arrecife
24. Honduras Digital Challenge
25. C&D Tecnologia
26. CARE Internacional
27. Fundación Capital
28. GOAL
29. Heifer
30. Impact Hub Tegucigalpa
31. OXFAM
32. Rainforest Alliance
33. Red Latinoamericana de Universidades por el Emprendedurismo Social- RedUnEs
34. Swiss Contact
35. ARA Development
36. CONSUCOOP – Consejo Nacional Supervisor de las Cooperativas
37. REDCAN – Red Centroamericana de Negocios
38. Dacotrans

UNIVERSITIES

1. Universidad Politécnica De Ingenieros
2. Universidad Zamorano
3. Universidad tecnológica Centro América
4. Universidad Tecnológica de Honduras – HUB UNITEC
5. Universidad Autónoma De Honduras
6. Universidad Católica De Honduras
7. Universidad Metropolitana De Honduras

ANNEX B

SERVICES PROVIDED BY PROGRAMS THAT SUPPORT ENTREPRENEURSHIP

Costa Rica: Main services provided by public instruments across pillars of the entrepreneurship ecosystem.

Institución	Name of the Program	Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure	Business education	Collaborative networks and markets	Tax incentives	Public procurement	Policy	Focus on women	Budget 2019 Colones CR
CORREOS DE COSTA RICA	Pymexpress														
Ministerio de Ciencia, Tecnología y Telecomunicaciones	Fondo Propyme														
Instituto Nacional de las Mujeres	Programa Nacional de Mujeres Empresarias														50,000,000
Promotora de Comercio Exterior	Ramp-up & Seed Costa Rica														3,064,250
MEIC	PYME DIGITAL														1,935,360,015
Consejo Nacional para Investigaciones Científicas y Tecnológicas	Fondo de Incentivos, Ley 7169; Fondo Propyme, Ley 8262; Programa de Innovación y Capital Humano para la Competitividad, Ley 9218														
Total Budgets of Public Policy Instruments that Support the Entrepreneurship Ecosystem															1,988,424,265

Costa Rica: Main services provided by supporting organizations across pillars of the entrepreneurship ecosystem.

Institution / Name of the Program	Access to Finance				Technology Adoption R&D			Business education	Collaborative networks and markets	Tax incentives	Public procurement	Policy	Focus on women
	Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure						
COOPERATIVA DE SERVICIOS A MUJERES PRODUCTORAS Y MICROEMPRESARIAS, COPEMUPRO, R.L.													
(ULACIT)													
Parque Tec													
TEC Emprendre LAB, Tecnológico de Costa Rica													
CIEBT													
Bolsa Nacional de Valores													
CEGESTI													
EDUARDO ROJAS FERNANDEZ													
Cámara de Exportadores de Costa Rica (CADEXCO)													
Alianza Empresarial para el Desarrollo													
Colegio Universitario de Limón													

El Salvador: Main services provided by public instruments across pillars of the entrepreneurship ecosystem

Agency	Program	Supply pillars				Barriers			Demand pillars			Budget in 2019
		Access to infrastructure	Access to equipment	Human capital	Tech adoption	Access to finance	Regulations	Collaboration	Market access	Managerial training	Change of mindset	
BANDESAL	Banca Mujer -2											2,241,900
	Banca Mujer -1											1,182,494
	Fondo Mujer -2											454,234
	Banca Emprendes											480,763
CONAMYPE	Desarrollo Artesanal											626,641
	Emp Femenina											87,408
	Un Pueblo Un Producto											278,000
	Formalización y Financiera											
	Compras Públicas											50,000
	Desarrollo Proveedores											25,000
	Corredores Productivos											3,239,403
	Acceso a Mercados											50,000
MINEC	InnovaEmprende											
	Innovatics											100,000
	Fodepro											3,300,000
	Budget in 2019	-	3,615,344	1,100,000	8,333	1,503,130	-	724,848	1,509,880	2,376,783	1,277,525	12,115,843

El Salvador: Main services provided by supporting organizations across pillars of the entrepreneurship ecosystem

	Supply pillars				Barriers			Demand pillars		
	Access to infrastructure	Access to equipment	Human capital	Tech adoption	Access to finance	Regulations	Collaboration	Market access	Managerial training	Change of mindset
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
Budget in 2019	-	-	203,866	82,184	10,000	2,190,048	332,438	135,264	2,741,084	2,528,367

Guatemala: Main services provided by public instruments across pillars of the entrepreneurship ecosystem

Institución	Name of the Program	Access to Finance				Technology Adoption R&D							Budget 2019 USD		
		Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure	Business education	Collaborative networks and markets	Tax incentives	Public procurement		Policy	Focus on women
BANRURAL	Micro, Small and Medium Enterprise Program														315,000
MINECO	Promoting Entrepreneurship Culture and Networks														2,287,582
	Pre-incubación, Incubación y Aceleración de emprendimientos a MIPYMES														2,269,780
	Proyectos de Competitividad, Inversión y Clima de Negocios														425,551
	Innovation and Associativity for Handcrafts														
MAG	Strengthening Productivity and Markets														n/a
MINED	Capacity building for Entrepreneurship (Basicos Middle School Level)														n/a
SENACYT	-EMPRENDE CTI y TRANSFIERE CTI														1,454,475
SEC Obras Sociales	Women Economic Empowerment														1,899,103
USAC	Faculty of Engineering -Entrepreneurship Center of Engineers														16,213
	General Research Center -Research and Industrial Development														90,791
	Faculty of Economics -Pre-Incubación de Emprendedores, Coaching para emprendedores														16,213
CONJUVE	Banco Nacional de Oportunidades														n/a
INTECAP	INTECAP (public-private)														n/a
Municipality of Guatemala	Entrepreneurship Center														116,732
Total Budgets of Public Policy Instruments that Support the Entrepreneurship Ecosystem														8,891,438	

Guatemala: Main services provided by supporting organizations across pillars of the entrepreneurship ecosystem

	Access to Finance				Technology Adoption R&D			Business education	Collaborative networks and markets	Tax incentives	Public procurement	Policy	Focus on women	Budget 2019 USD
	Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure							
LEGALSA / Startups LEGALSA														28,015.56
Campus Tecnológico S.A.														151,311.40
Fundesa														64,850.84
Red Nacional de Grupos Gestores														70,000.00
Centro de Estudio y Cooperación Internacional, CECI														501,028.02
Universidad Rafael Landívar														-
How Fun Studio														-
Progreso X S.A.														648,508.43
Multiverse														303,501.95
Technoserve														131,258.11
Aspen Network of Development Entrepreneurs														172,774.32
Swisscontact														311,284.05
Bs Legals														2,594.03
Asociación para la inversión, innovación y emprendimiento en Guatemala - ASEGUA														16,861.22
Cámara de industria de Guatemala														19,727.63
PRODETUR - centro de desarrollo empresarial e innovación, CDEIN														429,976.65
Centro de Estudio y Cooperación Internacional, CECI														5,188.07
Walt Whitman American Center														64,850.84
Fundación Vital Voices														16.21
Centro de Emprendimiento Las Baganvillas														3,242.54
Guatetrending														46,692.61
Asociación Guatemalteca de Exportadores														38,910.51
Universidad del Valle de Guatemala														123,216.60
Impacto Empresarial Consultores Asociados														-
Centro de Emprendimiento Kirzner														500,000.00
Heifer Internacional Guatemala														428,015.56
Banco de los Trabajadores														194,552.53
Total Budgets of Intermediary Organizations that Support the Entrepreneurship Ecosystem														4,256,377.68

Honduras: Main services provided by public instruments across pillars of the entrepreneurship ecosystem

Institución	Access to Finance				Technology Adoption R&D							Budget 2019 USD		
	Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure	Business education	Collaborative networks and markets	Tax incentives	Public procurement		Policy	Focus on women
Secretaría de Desarrollo Económico														13,500,000.00
Secretaría de Estado en el Despacho de Desarrollo Económico														3,827,210.00
Comisión Naranja														
Gerencia de Competitividad Alcaldía Municipal de San Pedro Sula														2,150,000.00
Prospera Consortium														1,000,000.00
Instituto Hondureño de Ciencia, Tecnología y la Innovación (IHCIETI) / Secretaría Nacional de Ciencia, Tecnología														40,000,000.00
Secretaría de Desarrollo Económico														3,000,000.00
SENPRENDE														
Secretaría de Trabajo y Seguridad Social														8,343,633.62
Secretaría de Agricultura y Ganadería														2,236,739,882.00
Total Budgets of Public Policy Instruments that Support the Entrepreneurship Ecosystem													2,308,560,726	

Honduras: Main services provided by supporting organizations across pillars of the entrepreneurship ecosystem

	Access to Finance				Technology Adoption R&D				Tax incentives	Public procurement	Policy	Focus on women	Budget USD
	Grants and vouchers	Equity finance	Credit guarantees	Loans and credit	Technology adoption services	Co-working space, incubators and accelerators	Technology parks, research infrastructure	Business education					
CDE MIPYME Región Occidente													1,306,474.20
Voces Vitales Honduras													63,286.00
Fundación Eléutera													16,227.18
CDE MIPYME REGIÓN SANTA BARBARA													0.89
CDE MIPYME REGIÓN VALLE DE LEAN													116,835.70
CIRCUITOS Y DESARROLLOS EN TECNOLOGIA S DE RL													3,245.44
CDE MIPYME REGIÓN EL PARAISO													115,618.66
CDE MIPYME REGIÓN LA MOSQUITA													83,410.30
CDE MIPYME REGIÓN VALLES DE OLANCHO													129,817.44
Cámara de Comercio e Industria de Tegucigalpa (CCIT)													316,105.48
Universidad Nacional Autónoma de Honduras													-
CDE Mipyme Cordillera Nombre de Dios													89,249.49
HUB UNITEC													24,340.77
ANMPIH													-
FEDECAMARA													20,283.98
CDE MIPYME Golfo de Fonseca													704,423.53
Honduras Digital Challenge													528,556.80
Founder Institute Honduras													4,868.15
Total Budgets of Intermediary Organizations that Support the Entrepreneurship Ecosystem													3,522,744
Total Sum of CDE / Public-Private													2,749,562
% of CDE of Total Supporting Instruments													78%

ANNEX C

LIST OF STAKEHOLDERS, SURVEY RESPONDENTS, AND PARTICIPANTS IN FOCUS GROUPS

C.1 CENPROMYPE

Coordination and consultations for the study

- Miosotis Rivas Peña, former Executive Director
- David Cabrera, Acting Executive Director
- Roxana Durán de Ayala, Public Policy Manager
- Leonardo Aguilar, e-Commerce Specialist
- Katya Moreira, Business Services Coordinator
- Michelle Herrera, Entrepreneurship Coordinator
- Milton Merino, IT Systems and Statistics Coordinator

C.2 COSTA RICA

Respondents of public programs survey

- Adelita Arce Rodríguez, Jefe de la Secretaría Técnica de Incentivos, Ministerio de Ciencia, Tecnología y Telecomunicaciones
- Alejandra Rojas Núñez, Profesional Especialista, Instituto Nacional de las Mujeres
- Priscilla Morera, Gestora de Incubación y Aceleración, Promotora de Comercio Exterior
- Gabriela León Segura, Directora, MEIC
- Stephanie Vargas Alvarado, Dirección de Investigación desarrollo e innovación, Correos de Costa Rica
- Alejandra Arayo Marroni, Coordinadora de la Unidad de Evaluación Técnica, Consejo Nacional para Investigaciones Científicas y Tecnológicas
- Diego Ching Vindas, Coordinador de Emprendimiento e Innovación, Sistema de Banca para el Desarrollo

Respondents of intermediary organizations survey

- Marta Campos Méndez, Gerente, Cooperativa de Servicios a Mujeres Productoras Y Microempresarias (COOPEMUPRO, R.L.)
- César Enríquez Caruzo, Director Académico Facultad Ciencias Empresariales

- Universidad Latinoamericana de Ciencia y Tecnología (ULACIT)
- Marcelo Lebendiker, Presidente, Parque Tec
- Rytha Picado Arroyo, Coordinadora TEC Emprende LAB, TEC Emprende LAB, Tecnológico de Costa Rica
- Oscar Chavarria Salazar, Gestor, Centro de Incubación de Empresas de Base Tecnológica (CIEBT)
- María Brenes Quesada, Directora de Negocios y Relaciones Corporativas, Bolsa Nacional de Valores
- FUNDES
- Daira Gómez, Directora Ejecutiva, CEGESTI
- Eduardo Rojas Fernández, Asesor Turístico/ Técnico En Turismo
- Walter Delangton Villavicencio, Director Ejecutivo, Cámara de Exportadores de Costa Rica (CADEXCO)
- María Fernanda Pérez Fernández, Directora Dimensión Económica, Alianza Empresarial para el Desarrollo
- Daniel Agames Acuña, Director a.i. de Planeamiento y Desarrollo, Colegio Universitario de Limón
- Rodolfo Molina, Presidente, Cámara Textil Costarricense (CATECO)

Participants in functional analysis focus group

- Gabriela León, Ministerio de Economía, Industria y Comercio
- Carola Medina, Ministerio de Ciencia, Tecnología y Telecomunicaciones (MICITT)
- John Molina, Instituto Costarricense de Electricidad (ICE)
- Priscilla Morera, Promotora del Comercio Exterior de Costa Rica (PROCOMER)
- Allan Matarrita, The Sonar Company
- Cesar Pablo Enriquez, Universidad Latinoamericana de Ciencia y Tecnología (ULACIT)
- Alvaro Villalobos Bonilla, ULACIT
- Guillaume Pollock, CAMTIC
- Diego Ching, SBDR-CR

- Adrian García, Carao Ventures
- Johnny Aguirre, WoWeMotions
- Luis Ortiz, IbyLit
- Bryan Navarro, Imagine XYZ
- Cesar Rodriguez Bravo, ULeads
- Rytha Picado, TEC Lab
- Victor Acosta, Banco Nacional CR
- Ximena Lacayo, Banco de América Central (BAC)
- Alejandra Araya

C.3 HONDURAS

Respondents of public programs survey

- Aída Rodríguez, Directora de Promoción Internacional, Secretaría de Desarrollo Económico
- María Emelinda Lara, Directora General de Sectores Productivos, Secretaría de Estado en el Despacho de Desarrollo Económico
- Claudia Avila, Coordinadora Nacional del Servicio de Empleo, Secretaría de Trabajo y Seguridad Social
- Ricardo Arturo Peña Ramirez, Director Unidad de Planeamiento y Evaluación de la Gestión, Secretaría de Agricultura y Ganadería
- Lorenza Durón, Comisionada, Comisión Naranja
- José Antonio Díaz Valladares, Gerente de Competitividad, Gerencia de Competitividad Alcaldía Municipal de San Pedro Sula
- Ana Romero, Sub Directora Ejecutiva, Instituto Hondureño de Ciencia, Tecnología y la Innovación (IHCIETI) /Secretaría Nacional de Ciencia y Tecnología
- Noé Fernando Escalante, Encargado de Asistencia Técnica, SENPRENDE
- Gabriela Montenegro, Directora, Prospera Consortium

Respondents of intermediary organizations survey

- Jose Octavio Alvarado Herrera, Responsable de la Unidad de Gestión de Proyectos, Centro De Desarrollo Empresarial Para La MIPYME Región Occidente
- Sully Pacheco, Directora Ejecutiva, Voces Vitales Honduras
- Elena Toledo, Directora Ejecutiva, Fundación Eleutera

- Daniel Armando López Alvarado, Director Ejecutivo, Centro De Desarrollo Empresarial De La Micro, Pequeña Y Mediana Empresa Región Santa Barbara
- Kelly Johana Alemán, Directora Ejecutiva, Cde MIPYME Región Valle De Lean
- Edwyn Tizado, Director Comercial, Circuitos Y Desarrollos En Tecnología S De RL
- Luz del Carmen Godoy Martel, Directora Ejecutiva, Cde MIPYME Región El Paraíso
- Terry Heston Martinez, Director Ejecutivo, Cde MIPYME Región La Mosquitia
- Juan Carlos Paz, Director, Centro De Desarrollo Empresarial Región Valles De Olancho
- Karla Jackeline Ruiz Betancourt, Gerente General, Cámara De Comercio E Industria De Tegucigalpa (CCIT)
- Julio Raudales Torres, Vicerrector de Relaciones Internacionales, Universidad Nacional Autónoma De Honduras
- Ingrid Montes de Oca Soto, Directora Ejecutiva, CDE MIPYME Cordillera Nombre De Dios
- Ángel Josué Reyes, Coordinador de Emprendimiento, HUB UNITEC
- Julio Escoto Córdova, Director Ejecutivo, Asociación Nacional De La Mediana Y Pequeña Industria De Honduras, ANMPIH
- Ana Velasquez Mancia, Coordinadora de Proyectos, FEDECAMARA
- Digna Elizabeth García Vasquez, Asesor en Monitoreo, CDE MIPYME Golfo De Fonseca
- Kevin Dubón, Coordinador Técnico, Honduras Digital Challenge
- Jacinto Enrique Cho Escobar, Director, Founder Institute Honduras

Participants in functional analysis focus groups

- Roxana Durán, CENPROMYPE
- Andrea Caminals, SENPRENDE
- Wendy Molina, SENPRENDE
- Ricardo Alemán, SENPRENDE
- Karla Ruiz, Cámara de Comercio e Industria de Tegucigalpa

- Yuliana Valladares, Asociación de Empresas de Tecnología, ASEMTECH
- David Sandino, Founder Institute Honduras
- Jacinto Cho, Founder Institute Honduras
- Julio Escoto, Asociación Nacional de Micro y Pequeña Industria de Honduras
- Esperanza Escobar, Asociación Nacional de Micro y Pequeña Industria de Honduras
- Carolina Estrada Zelaya, ANDI
- Ángel Josué Reyes, Hub UNITEC
- Gabriela Torres, UNITEC, Tech4Dev HN
- Elena Toledo, Fundación Eleutera
- Bessy Bendana, Comisión Naranja
- Edgardo Flores, Think Digital
- Alejandra Nazar Kafati, Think Digital
- Mario Nazar, Cloud Biz
- Isaac Ferrera, Escuela Agrícola El Zamorano
- José Elvin Salgado, Dr. 7
- Eduardo Facusse, Empresario
- José Luis Moncada, Banco Atlantida, HDC
- Kevin Dubon, Banco Atlántida, HDC
- Jimerson Asencio, FICOHSA
- José Dubon, Centro de Desarrollo Empresarial, Región Occidente
- Elder Fuentes, Centro de Desarrollo Empresarial, Región Occidente
- Lixa Hernández, SENPRENDE
- Wendy Ventura, SENPRENDE
- Wendy Orellana, SENPRENDE
- Víctor Ortíz
- Marco Calderón
- Ricardo Nohé Centeno Sierra

C.4 GUATEMALA

Respondents of public programs survey

- Héctor Byron Garrido, Jefe de Planificación, INTECAP
- Henry Stuardo Ortíz Paiz, Jefe del Departamento de Comercio y Mercadeo, Ministerio De Agricultura, Ganadería Y Alimentación
- Olga Elisa Contreras Solórzano, Encargada de la Dirección de Generación y Transferencia de Conocimiento, Secretaría Nacional de Ciencia y Tecnología (SENACYT)
- José Francisco, Ruiz Guerra, Asesor de Emprendimiento e Innovación, Ministerio de Economía
- Adalgiza Reina, Asesora de Articulación Productiva e Inserción a Cooperativas, Ministerio de Economía
- Myra Lucrecia Zamora Sum, Técnico de Telesecundaria Ministerio de Educación
- Nora Leonor Garcia Tobar, Encargada Area de Emprendimiento, Facultad de Ingeniería, Universidad de San Carlos de Guatemala
- Facultad de Ciencias Económicas, Universidad de San Carlos de Guatemala, Centro de Emprendimiento Emprendec
- Liuba María Cabrera de Villagran, Coordinadora Programa Universitario de Investigación en Desarrollo Industrial PUIDI y en Alimentación y Nutrición PRUNIAN, Dirección General de Investigación, Universidad USAC
- Julio Raúl Suarez, Gerente MIPYME, Banco de Desarrollo Rural, Sociedad Anónima
- Amán José Sánchez, Asesor de Clima de Negocios, Programa Nacional De Competitividad
- Sharon Girón, Asesor de Proyectos, Secretaría de Obras Sociales de la Esposa del Presidente
- Arnoldo Rafael Rodríguez Maldonado, Coordinador Banco Nacional de Oportunidades -BANOP, Consejo Nacional de la Juventud (CONJUVE)
- Josefina Sontay, Coordinador General, Centro Municipal de Emprendimiento, Municipalidad de Guatemala

Respondents of intermediary organizations survey

- Jose Bassila, Abogado Asociado, LEGALSA / Startups LEGALSA

- Andrés Hermés, Encargado de Incubadoras y Relaciones Institucionales, Campus Tecnológico S.A.
- Juan Carlos Zapata, Director Ejecutivo, Fundesa
- Red Nacional de Grupos Gestores
- Silvia Cotton, Centro de Estudio y Cooperación Internacional (CECI)
- Olivia Arango, Coordinadora Académica, Universidad Rafael Landívar
- Manuel Martínez, Cofundador, How Fun Studio
- Erick Melgar, Gerente General, Progreso X S.A.
- Ricardo Gavidia, Process Officer, Multiverse
- Fernando Escalante, Coordinador de Programa, Technoserve
- Evelyn Hernández, Coordinadora Senior Capítulo Centroamérica y México, Aspen Network of Development Entrepreneurs
- Kurt Schneider, Director País, Swisscontact
- Ana Lucía Barrios Solares, Gerente General, Bs Legalis
- José Rivas, Presidente, Asociación para la inversión, innovación y emprendimiento en Guatemala (ASEGUA)
- Lesly Estrada, Coordinadora Guatemala Empeñe, Cámara de Industria de Guatemala
- Lucía Barrera, Directora, PRODETUR - Centro De Desarrollo Empresarial E Innovación, CDEIN
- Ana Rosa Orozco, Directora, Walt Whitman American Center
- Stephanie Ruiz, Directora Ejecutiva, Fundación Vital Voices
- Heidi Mariela Hichos Posadas, Coordinadora del Centro, Centro de Emprendimiento Las Buganvillas
- Daniel Roman, CEO, Guatetrending
- Rosy Dardón, Jefe de la Ruta para la internacionalización, Asociación Guatemalteca de Exportadores
- Monica Stein, Vicerrectora de Investigación y Vinculación, Universidad del Valle de Guatemala
- Hugo Cabrera, Director Ejecutivo, Impacto Empresarial Consultores Asociados

- Carolina Uribe, Directora, Centro de Emprendimiento Kirzner
- Gustavo Hernández Polanco, Director Nacional, Heifer International Guatemala
- Carmen Ortiz, Directora Corporativa de Comunicación y Mercadeo, Banco de los Trabajadores

Participants in functional analysis focus group

- Alvaro Navarro, Soltecorp
- Andrea Mazariegos, Swiss Contact
- Carlos Morales, Chemonics International (Agribusiness Innovation Project)
- Cesar Rodas, SIB Innovation Hub
- Erik Castellanos, BANTRAB
- Francisco Rivera, BANTRAB
- Neftali de León, BANTRAB
- Nestor Sagastume, BANTRAB
- Francisco Ruiz, MINECO
- Gerardo Martínez, SolandTec
- Andrés Hermés, Campus TEC
- Kenya Armas, Universidad San Carlos
- Lesly Estrada, Cámara de Industria de Guatemala
- Mónica Stein, Universidad del Valle de Guatemala
- María Zaghi, Comercializadora GT
- Mónica de Zelaya, Universidad Francisco Marroquín
- Carlos Arana, La Gran Sorpresa Carnicería
- Evelyn Juárez, Scale Up, FUNDESA
- Indyra Whitman, Queen Pizza

C.5 EL SALVADOR

Respondents of public programs survey

- Ministerio de Economía (MINEC)
- Secretaría de Innovación
- Comisión Nacional de la Micro y Pequeña Empresa (CONAMYPE)

- Banco de Desarrollo de El Salvador (BANDESAL)
- Organismo Promotor de Exportaciones e Inversiones de El Salvador (PROESA)
- Ministerio de Agricultura y Ganadería (MAG)
- Instituto de la Juventud (INJUVE)
- Fondo de Inversión Social para el Desarrollo Local (FISDL/MDR)
- Banco de Fomento Agropecuario (BFA)

Respondents of intermediary organizations survey

- Fundación Salvadoreña para el Desarrollo Económico y Social (FUSADES)
- IMPACT HUB
- B-PEACE
- ASÍ
- Cámara de Comercio
- ADEL Morazán
- Cámara Salvadoreña de Tecnologías de Información y Comunicaciones (CASATIC)
- ADEL San Miguel
- Universidad Gerardo Barrios
- Voces Vitales
- Seed Community
- El Mercadito
- Escuela de Comunicación Monica Herrera
- Escuela Superior de Economía y Negocios (ESEN)
- Universidad Católica de El Salvador (UNICAES)
- Universidad de Oriente (UNIVO)
- ADEL LA Unión
- Asociación de Instituciones Operadoras de Centros de Desarrollo de la Micro y Pequeña Empresa (ACDMYPE)
- WEAMERICAS

Participants in functional analysis focus group

- Alejandro Gomez Fernández, Banco Agrícola

- Christian Quiñonez, Innogen Capital
- Rodrigo Dumont, Innogen Capital
- Claudia Rodriguez, CASATIC
- Eduardo Francés, Hugo Ventures
- Jose Mario Avila, Hugo Ventures
- Ricardo Cruz, Hugo Ventures
- Iliana Benitez, Vertex Studio
- Iris Palma, ASI
- Karla Dominguez, ASI
- Jose Luis Barreto, Pulpo Fintech
- Jose Roberto Rodriguez, Impact Hub
- Luz Maria de Portillo, ABANSA
- Samuel Salazar, PROINNOVA/FUSADES
- Luis Martinez Perdomo, Universidad Francisco Gavidia

C.6 REGIONAL FOCUS GROUP FOR REGULATORY ENVIRONMENT

Participants in focus group

- Roxana Durán, CENPROMYPE
- Amán Sánchez, MINECO, Guatemala
- Ana Lucia Barrios, BS Legalis
- Andrea Mazariegos, SWC
- Blanca Mejía, Bufete Mejía
- Christian Betancourt, Consortium Legal
- Elena Toledo- F. Eleutera
- Jackie Foglia Sandoval, CNI-HN
- José Luis Moncada, HND Digital Challenge
- Frank Reinaldo Tosta, SENPRENDE-HND
- Kevin Dubon, HND Digital Challenge
- Marjorie Chorro de Trigueros, FUSADES

ANNEX D

SURVEY 1: DEMAND FOR DIGITAL SERVICES IN KEY SECTORS

D.1 SAMPLE

This survey leveraged online survey methods and an online survey firm's proprietary panel of respondents. The online survey process differs from a traditional survey process in which the researcher draws up a sample frame of firms in a country and then randomly selects firms from it for what are typically phone interviews. The online survey method is scalable and is considerably more cost-effective than a phone or computer-assisted telephone interview (CATI). Prior attempts at combinations of CATIs based on a sample frame and scalable online surveys have resulted in strikingly similar patterns in firms' performance between the two sets (when comparing firms of the same size, sector, and geography). The method also allowed more easily reaching firms that were not at their physical offices and by their phones due to COVID-19.

There are some tradeoffs between online and traditional sampling methods. Online surveys inherently capture firms that are at least to an extent digitized so they can take the survey online and have self-selected to take a survey about the use of technology (thus likely going in knowing something about technology use). Hence, the sample, to an extent, over-represents firms that are more technology-intensive (and export-oriented, larger, and better performing). However, from experience, this does not markedly alter the general patterns of firm performance and technology adoption from what they are in a CATI survey drawn from a sampling frame.

The survey used several measures to ensure quality. The survey tracked the quality of responses in real-time, as respondents took the survey, through embedded questions detecting the survey takers' emotional state and through fingerprinting that combines Internet protocol (IP) address, device type, screen size, and cookies to ensure only unique panelists enter the survey. It maintains a fraud score on each respondent based on historical completions (completion time as a percentage of the stated length of the survey + any flagged poor completes) and bans those that breach a certain level; the company also uses invisible ReCaptcha to defend against bots.

The survey was performed 26 October 2020–17 January 2021; a total of 2,806 firms started the survey, and 1,906 completed it. Twenty-six percent are micro-enterprises with 1-4 employees, 22 percent are small firms with 5-19 employees, 23 percent are midsize firms with 20-99 employees, and the remaining 28 percent are large firms (100 or more employees) (Figure D.1). The largest samples are from Guatemala and El Salvador and from the financial services and food processing sectors (Figure D.2). A female chief executive officer (CEO) leads a third of the firms; women are also prevalent in large male-led firms' management teams (Figure D.3 and Figure D.4). The surveyed firms are located both in the main urban centers and across provinces, including in more rural areas (Figure D.5).

Figure D.1.

SURVEYED FIRMS, BY COUNTRY AND SIZE

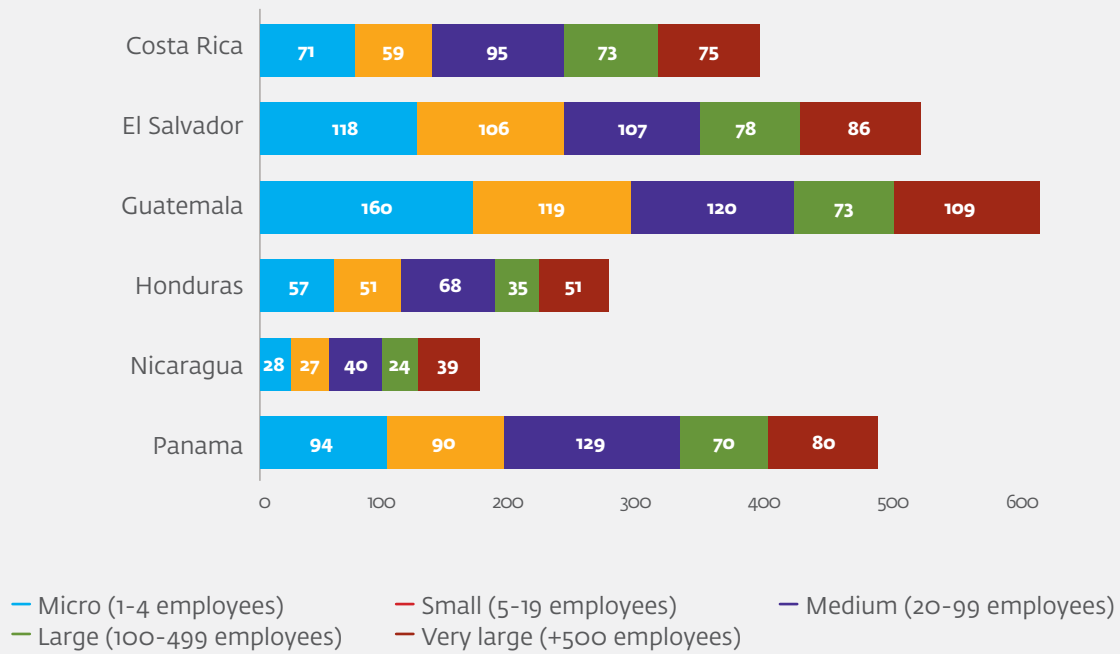


Figure D.2.

SURVEYED FIRMS, BY SECTOR AND SIZE

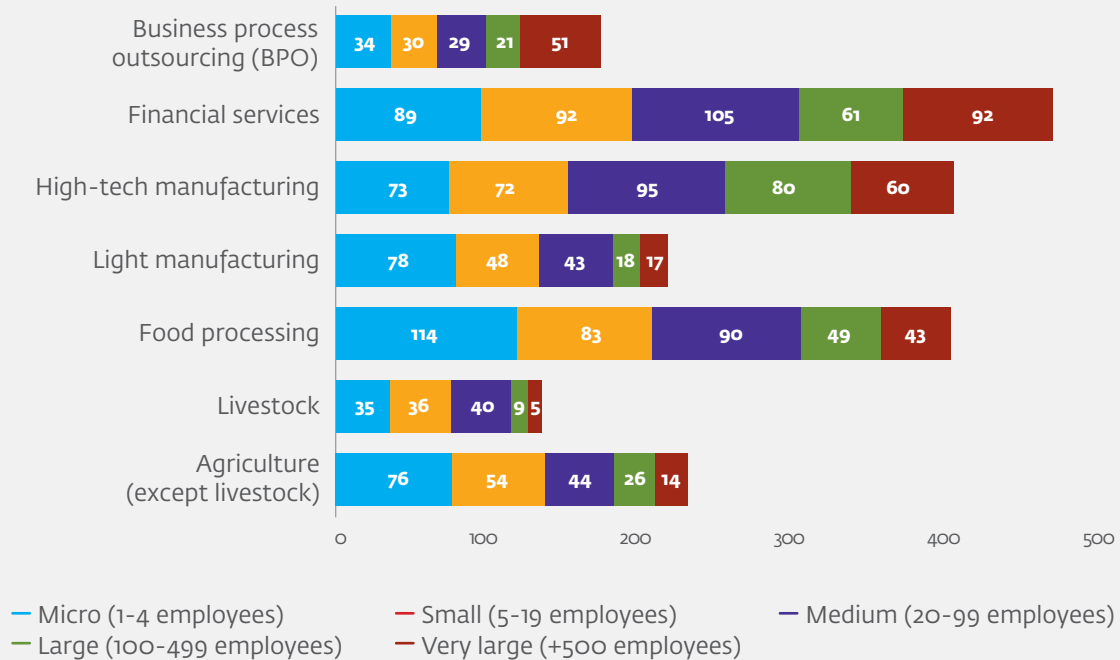


Figure D.3.

PERCENTAGE OF FIRMS, BY GENDER OF CEO AND SECTOR

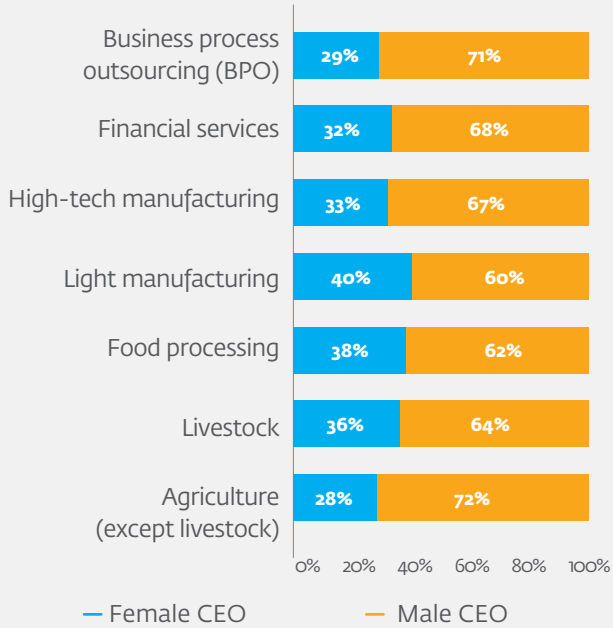


Figure D.4.

NUMBER OF FIRMS BY GENDER OF CEO AND GENDER DISTRIBUTION OF MANAGEMENT TEAM

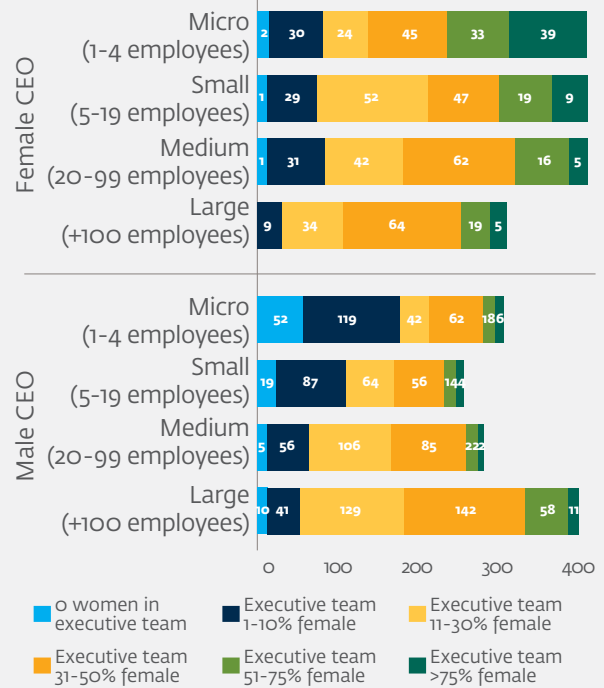
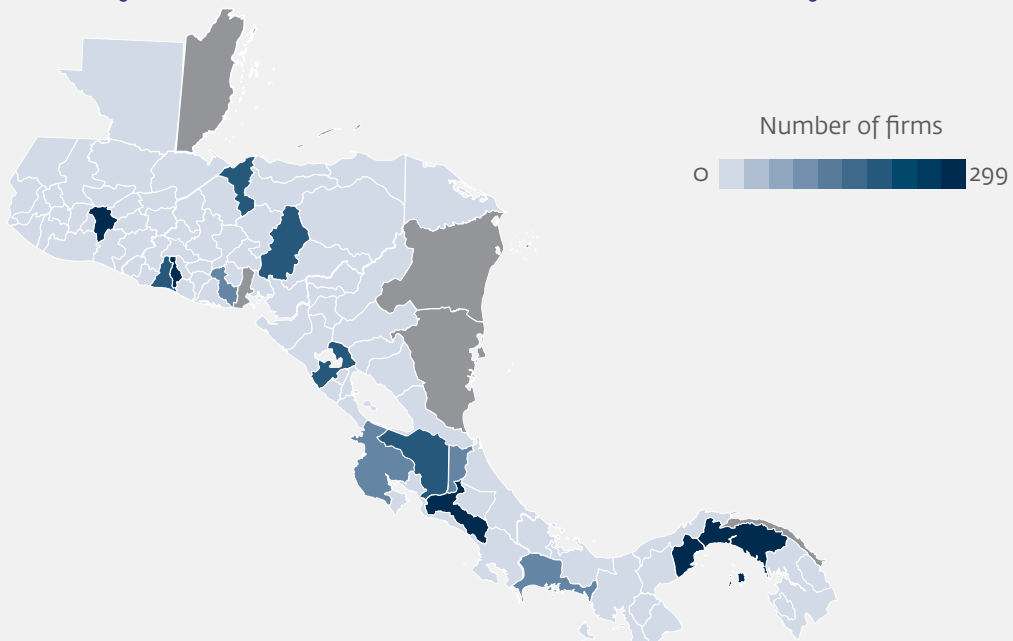


Figure D.5.

SURVEYED FIRMS BY PROVINCE/DEPARTMENT

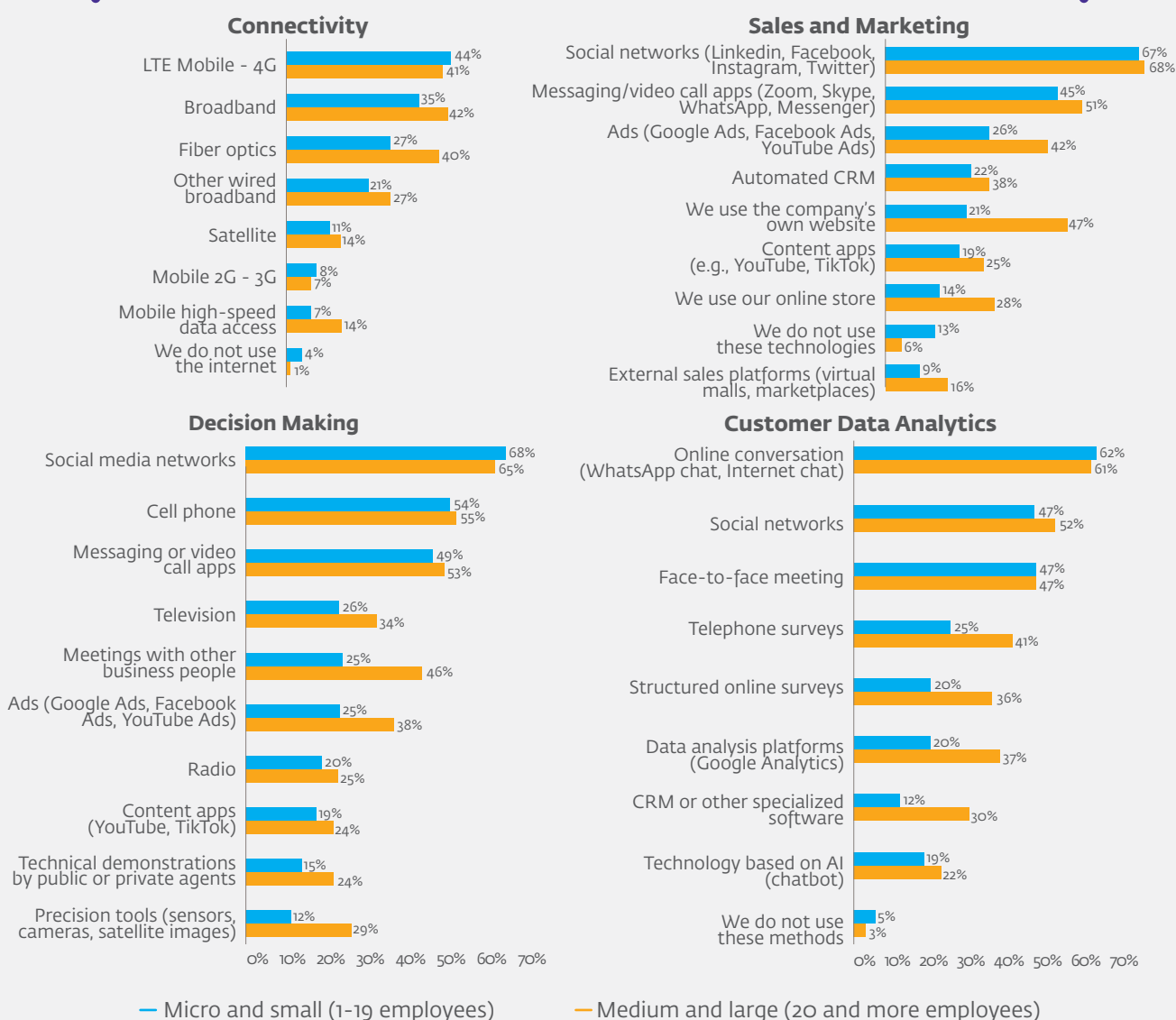


D.2 HOW DO FIRMS IN CENTRAL AMERICA USE TECHNOLOGIES IN THEIR OPERATIONS?

Technology use is highly correlated with firm size. Midsize and large firms are often better placed than micro and small firms to cover the fixed costs of technology adoption—including high-quality Internet, which enables the use of other technologies—and to acquire new staff capabilities to use technologies. Significant majorities of the micro and small firms use only the more basic technologies such as 4G mobile connections, social media, and video and messaging apps to get online, interact with customers, and make decisions (Figure D.6). A more substantial share—a quarter to a third, depending on the technology—of midsize and large firms have already started to use broadband, online stores and marketplaces, and specialized software to manage their customer relationships and operations; some have even ventured to use AI. Overall, the majority of firms of all sizes have yet to use the more sophisticated technologies such as AI, virtual reality, blockchain, or even e-commerce. This suggests that there are in Central America great opportunities for efficiency gains through the adoption of technology.

Figure D.6.

ADOPTION OF TECHNOLOGIES TO CONNECT ONLINE, MAKE DECISIONS, MANAGE SALES AND MARKETING, AND ANALYZE CUSTOMERS, BY FIRM SIZE



Larger firms have been earlier adopters of various sophisticated technologies. (See Figure D.7.) However, looking at the data on the adoption of technologies as a “digital journey” where small (and younger) firms gradually adopt new technologies as they grow, it appears that firms’ gateway to technologies is digital payments and technologies leveraging digital data, followed gradually, as firms grow, by technologies such as cybersecurity technologies, e-commerce, and cloud computing services—followed further by the adoption of AI, machine learning, blockchain, and virtual reality. Firms that have adopted more sophisticated technologies tend to have bundles of them and possibly

use one technology to augment another. For example, 48 percent of firms that use e-commerce marketplaces also use some form of AI, while only 6 percent of firms that do not use marketplaces use AI.

However, size is not the only differentiator in firms’ adoption of technologies. As is widely shown in multiple studies, more productive firms are also likelier to participate in trade—and continue innovating and adopting technologies to compete in international markets. In our survey, export-driven firms in all size categories notably outperform their non-exporter peers in the adoption of technologies (Figure D.8).

Figure D.7.

ADOPTION OF DIGITAL TECHNOLOGIES, BY FIRM SIZE

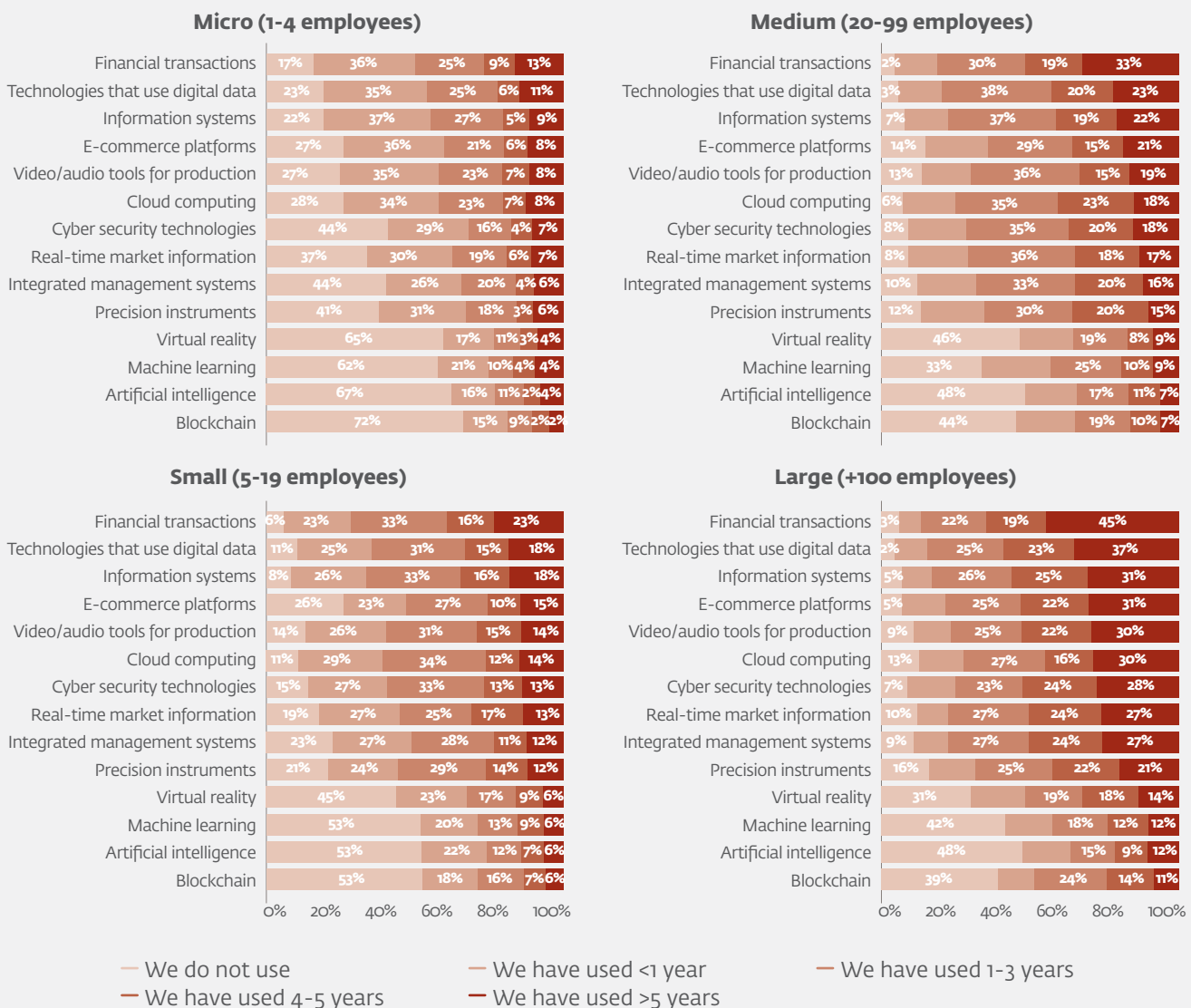
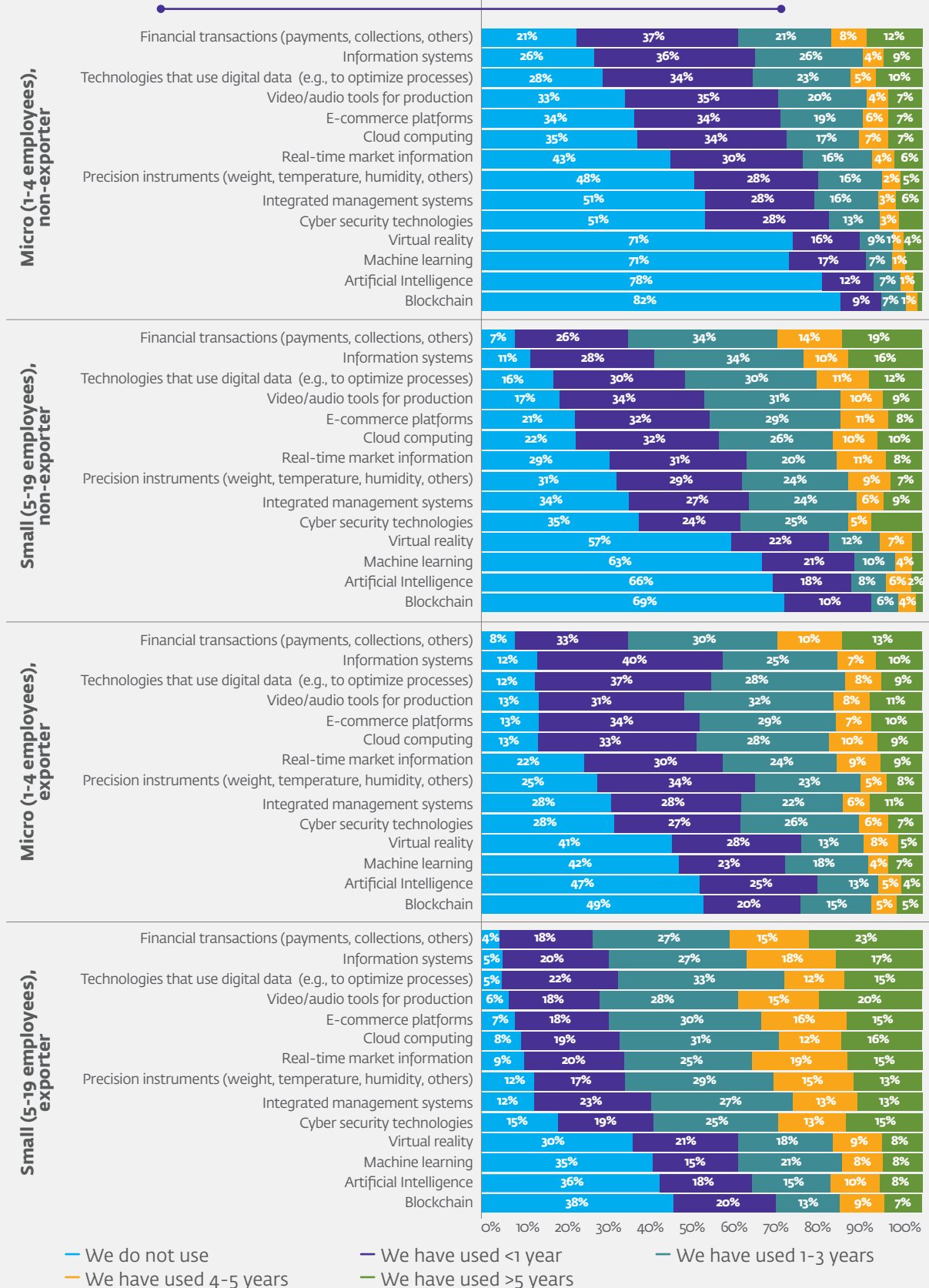


Figure D.8.

INTENSITY OF TECHNOLOGY USE, MICRO AND SMALL NON-EXPORTERS VS. EXPORTERS



There are also some variations across sectors in both the use of technologies and engagement in trade. A higher share of firms in services sectors—BPO and financial services—use technologies than do firms in the more traditional export sectors like agriculture and light manufacturing (Table D.1). Firms in services sectors also perceive themselves as using technologies more intensively; for example, midsize and large BPO and financial services firms rate the intensity of their technology use above 9 points on a 10 point scale in such areas as human resources, quality control, and sales and marketing, while midsize and large agricultural firms rate their technology use at 7.5 points out of 10. Smaller firms rate their technology use lower, especially in production or inventory management activities (Figure D.9 and Figure D.10). Comparable male- and female-led firms, however, have strikingly similar technology adoption rates and sequences (Figure D.11).

Table D.1.

PERCENTAGE OF FIRMS USING VARIOUS TECHNOLOGIES FOR AT LEAST ONE YEAR AND EXPORTING AND IMPORTING BY SECTOR (HIGHEST USAGE RATES HIGHLIGHTED)

	Agriculture (except livestock)	Livestock (cattle, pigs, poultry)	Food processing	Light manufacturing	High-tech manufacturing	Financial services	Business process outsourcing (BPO)
Technologies that use digital data	56%	57%	65%	53%	53%	74%	78%
Information systems	56%	58%	66%	59	59%	77%	76%
Precision instruments	49%	58%	64%	47%	47%	45%	47%
Cloud computing	51%	52%	57%	53%	53%	70%	75%
E-commerce platforms	52%	54%	55%	49%	49%	67%	68%
Financial transactions	59%	65%	70%	64%	64%	80%	78%
Real-time market information	54%	57%	53%	47%	47%	65%	62%
Integrated management systems	52%	51%	55%	44%	44%	62%	68%
Video/audio tools for production	54%	55%	63%	51%	51%	64%	74%
Virtual reality	31%	32%	29%	23%	23%	30%	29%
Artificial intelligence	34%	35%	29%	21%	21%	32%	32%
Blockchain	29%	28%	32%	21%	21%	30%	28%
Machine learning	31%	34%	34%	25%	25%	40%	37%
Cyber security technologies	43%	44%	52%	40%	40%	64%	67%
Export	60%	60%	58%	50%	68%	51%	55%
Import (to add value, not to re-sell)	46%	64%	56%	62%	68%	56%	44%

Figure D.9.

INTENSITY OF TECHNOLOGY USE IN BUSINESS OPERATIONS AMONG MICRO AND SMALL FIRMS, BY SECTOR (1=LOW; 10=HIGH)

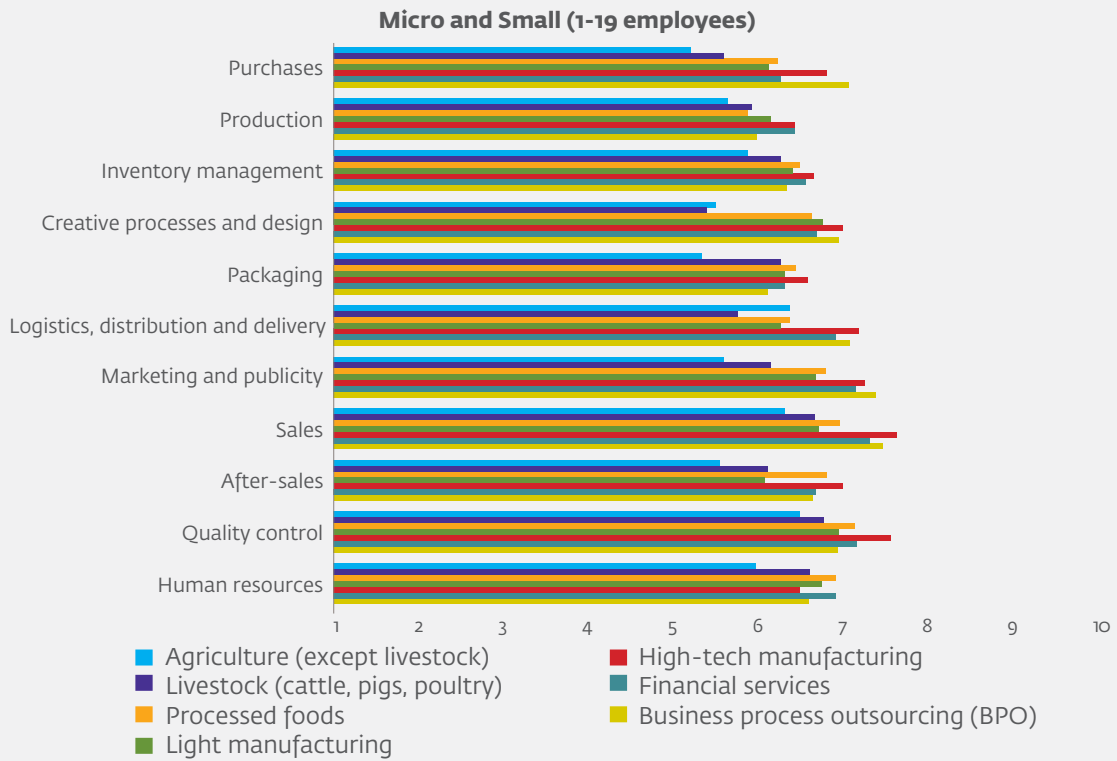


Figure D.10.

INTENSITY OF TECHNOLOGY USE IN BUSINESS OPERATIONS, MIDSIZE AND LARGE FIRMS, BY SECTOR (1=LOW; 10=HIGH)

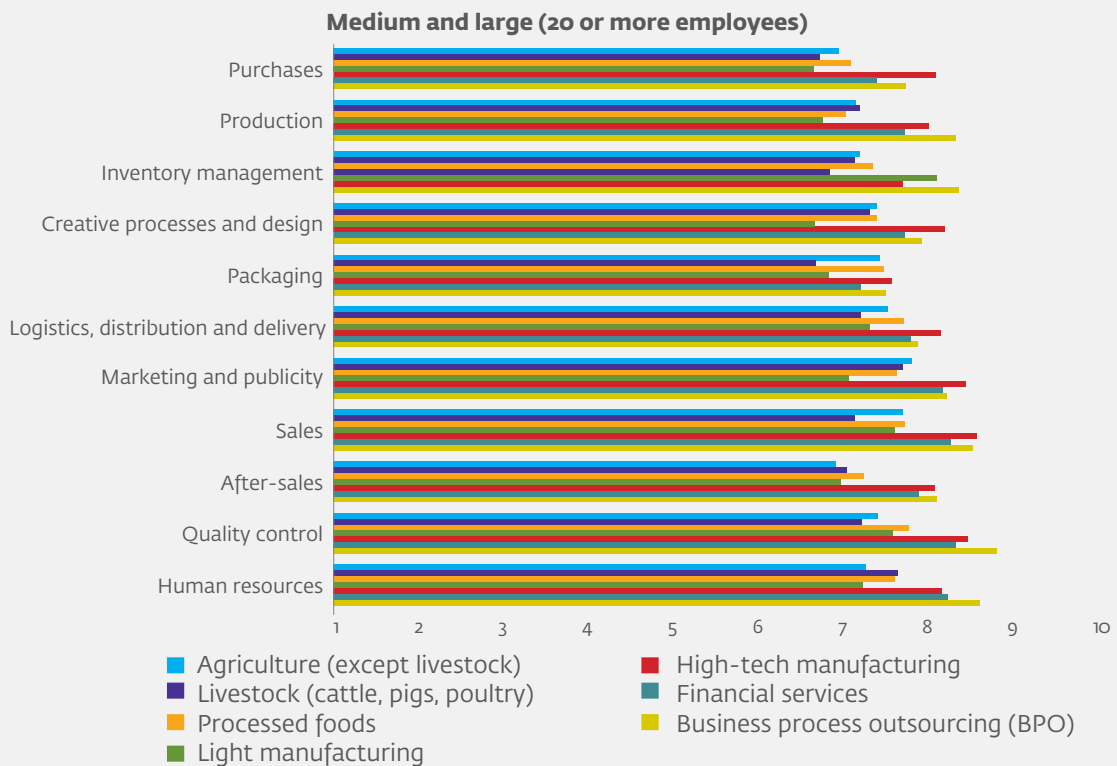
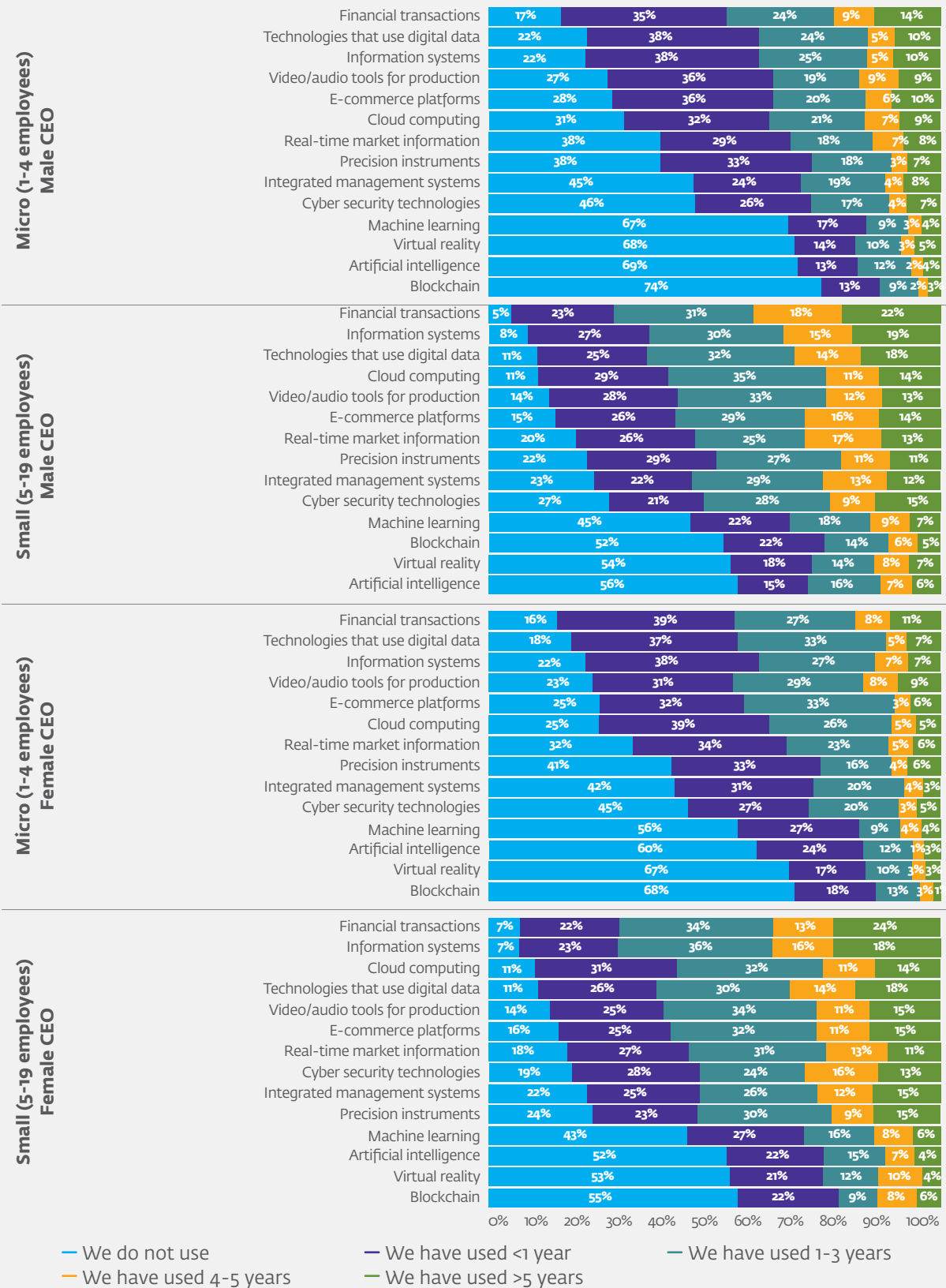


Figure D.11.

ADOPTION OF DIGITAL TECHNOLOGIES BY MICRO AND SMALL FIRMS, BY GENDER OF CEO



Asked about the reasons to adopt technologies, the surveyed firms cited the need to compete harder with domestic and international peers, access new markets, and develop new products. Firms also adopt new technologies to replace their legacy technologies (Figure D.12 and Figure D.13).

Figure D.12.

REASONS FOR TECHNOLOGY ADOPTION AMONG MICRO AND SMALL FIRMS, BY COUNTRY

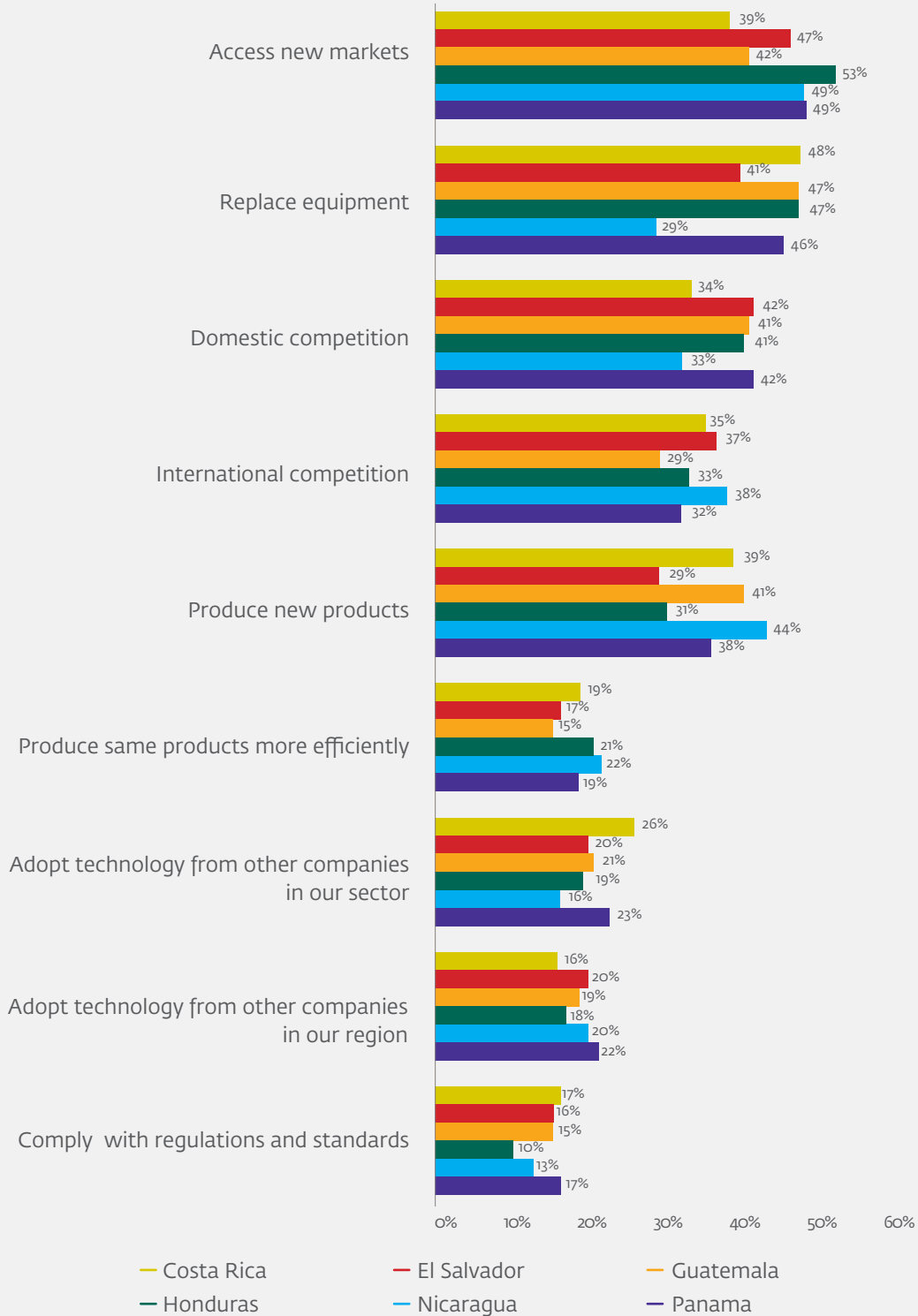
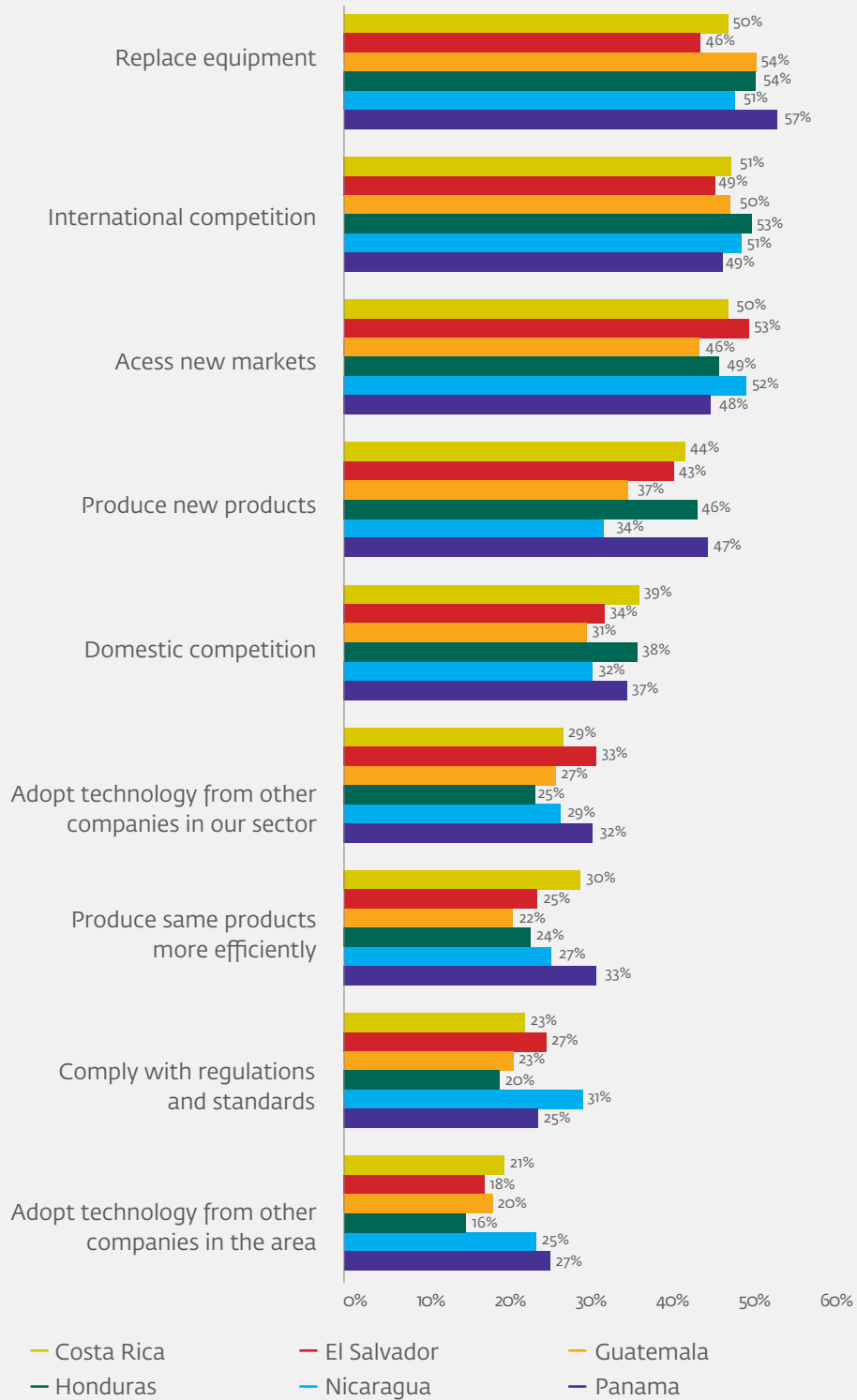


Figure D.13.

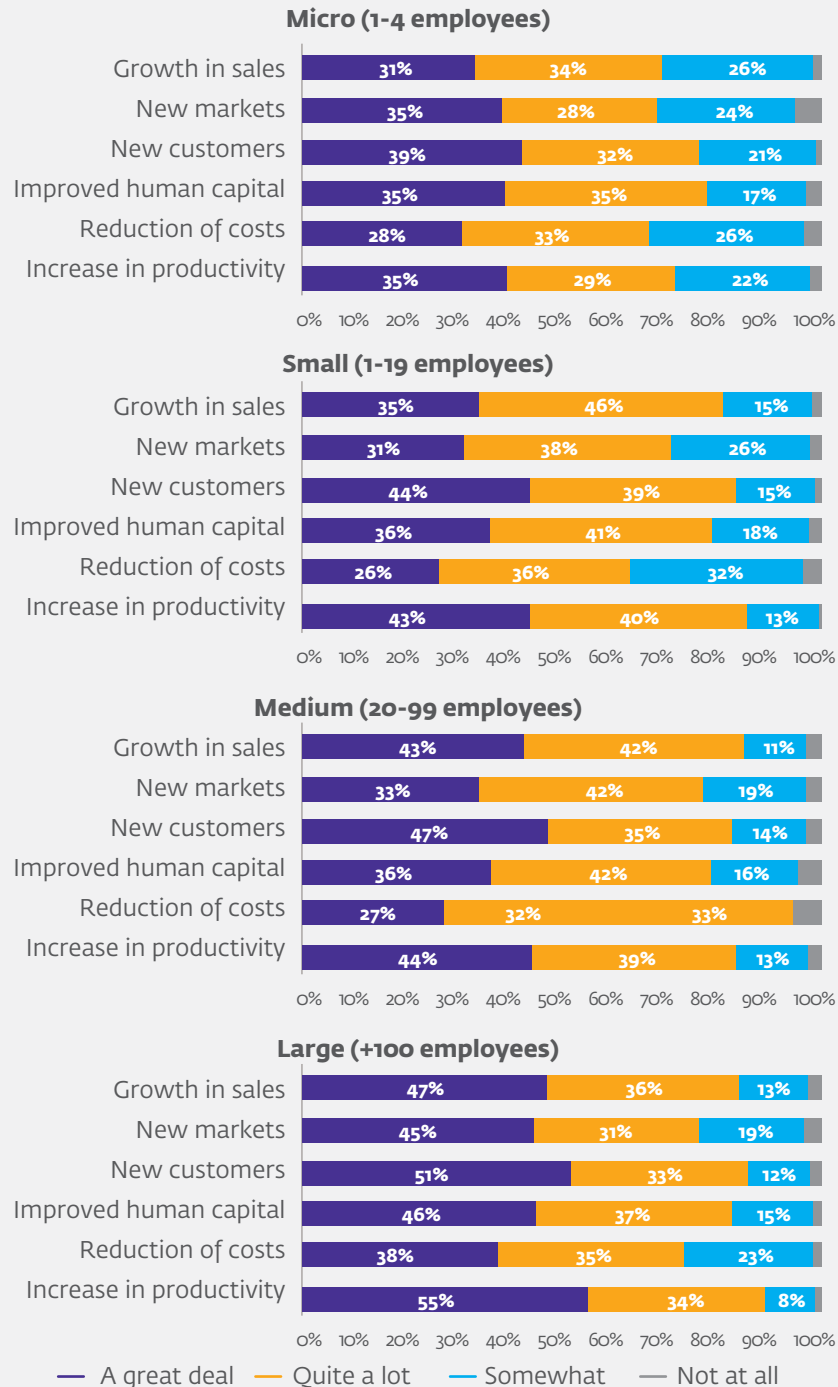
REASONS FOR TECHNOLOGY ADOPTION AMONG MIDSIZE AND LARGE FIRMS, BY COUNTRY



Promoting firms' technology adoption has important payoffs. The most technology-intensive firms report particularly large gains from technology use, especially in terms of new customers and increased productivity (Figure D.14).

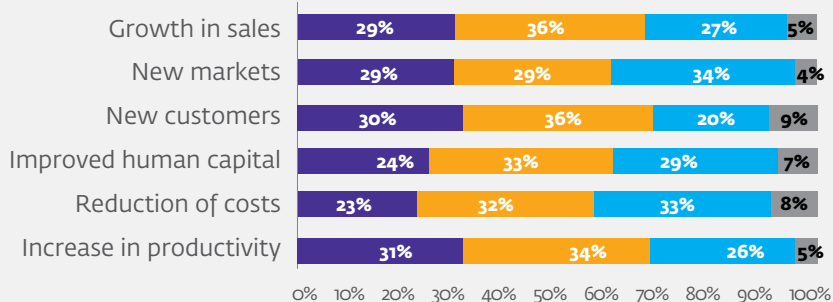
Figure D.14.

GAINS FROM THE ADOPTION OF TECHNOLOGIES, BY FIRM SIZE AND DIGITAL INTENSITY
MATURE DIGITIZERS (TOP-50 PERCENTILE IN INTENSITY OF USING TECHNOLOGIES)

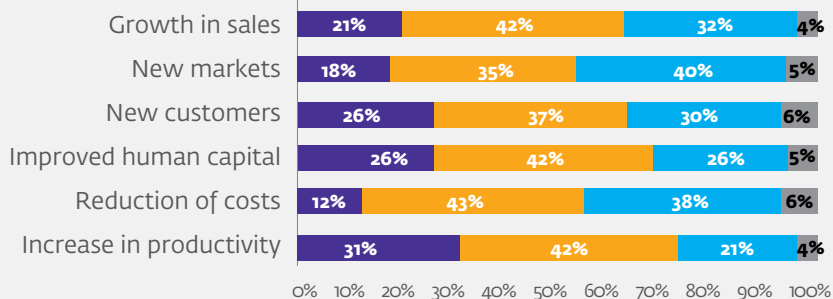


EMERGING DIGITIZERS (BOTTOM-50 PERCENTILE IN INTENSITY OF USING TECHNOLOGIES)

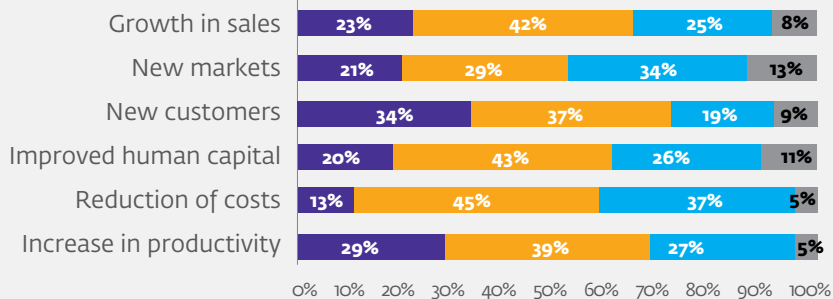
Micro (1-4 employees)



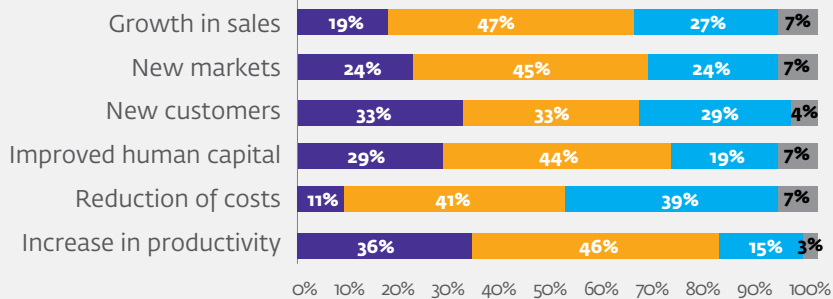
Small (1-19 employees)



Medium (20-99 employees)



Large (+100 employees)



— A great deal
 — Quite a lot
 — Somewhat
 — Not at all

D.3 CHALLENGES FACED BY FIRMS TO USE TECHNOLOGY

Robust digital capabilities and the use of online sales channels may help firms export and grow. However, many firms in Central America are still not using technologies intensively in their operations. This is not due to a lack of interest or understanding that technologies matter. Asked about the technologies that will transform their industries in the next decade, firms across sectors highlighted e-commerce, financial technologies, automation, and robotics (Figure D.15). However, the surveyed firms also cited a lack of knowledge about the various available technologies, concerns about the return on investment in technologies, and financing gaps as obstacles to the adoption of new technologies (Figure D.16). This may point to the need for public-private partnerships to enable firms to learn about and test technologies. So far, firms across the region have received technical assistance to apply technologies, especially from technology providers and associations (Figure D.17 and Figure D.18). Firms across size categories and countries call for more training about technologies and support for identifying the right technologies (Figure D.19 and Figure D.20).

Figure D.15.

NUMBER OF FIRMS SEEING A TECHNOLOGY AS MOST IMPACTFUL TECHNOLOGY IN THEIR SECTOR IN THE NEXT DECADE, BY SECTOR

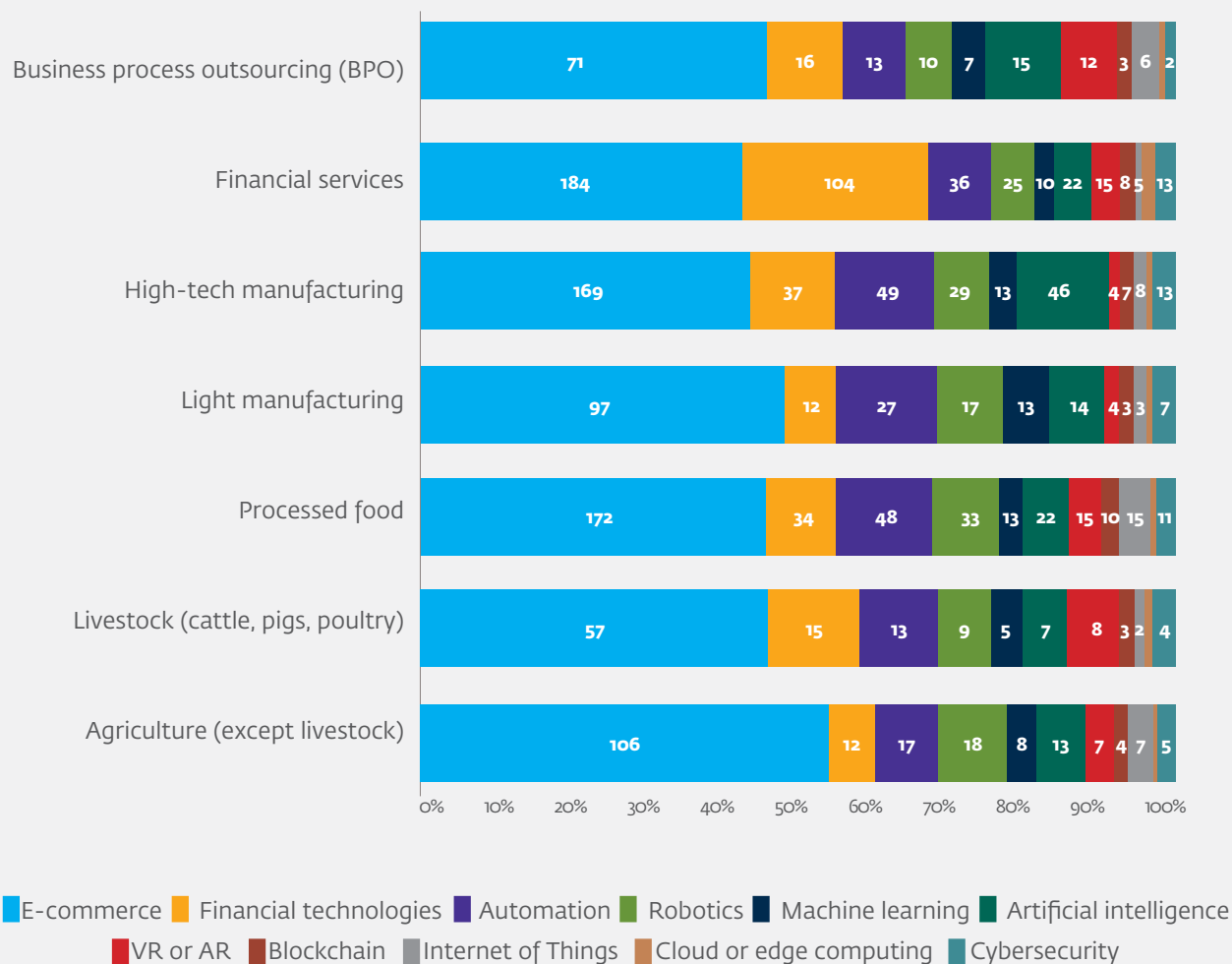


Figure D.16.

PERCENTAGE OF FIRMS MENTIONING AN OBSTACLE TO ADOPTING NEW EQUIPMENT, MACHINERY, SOFTWARE, OR DIGITIZING PROCESSES, BY FIRM SIZE

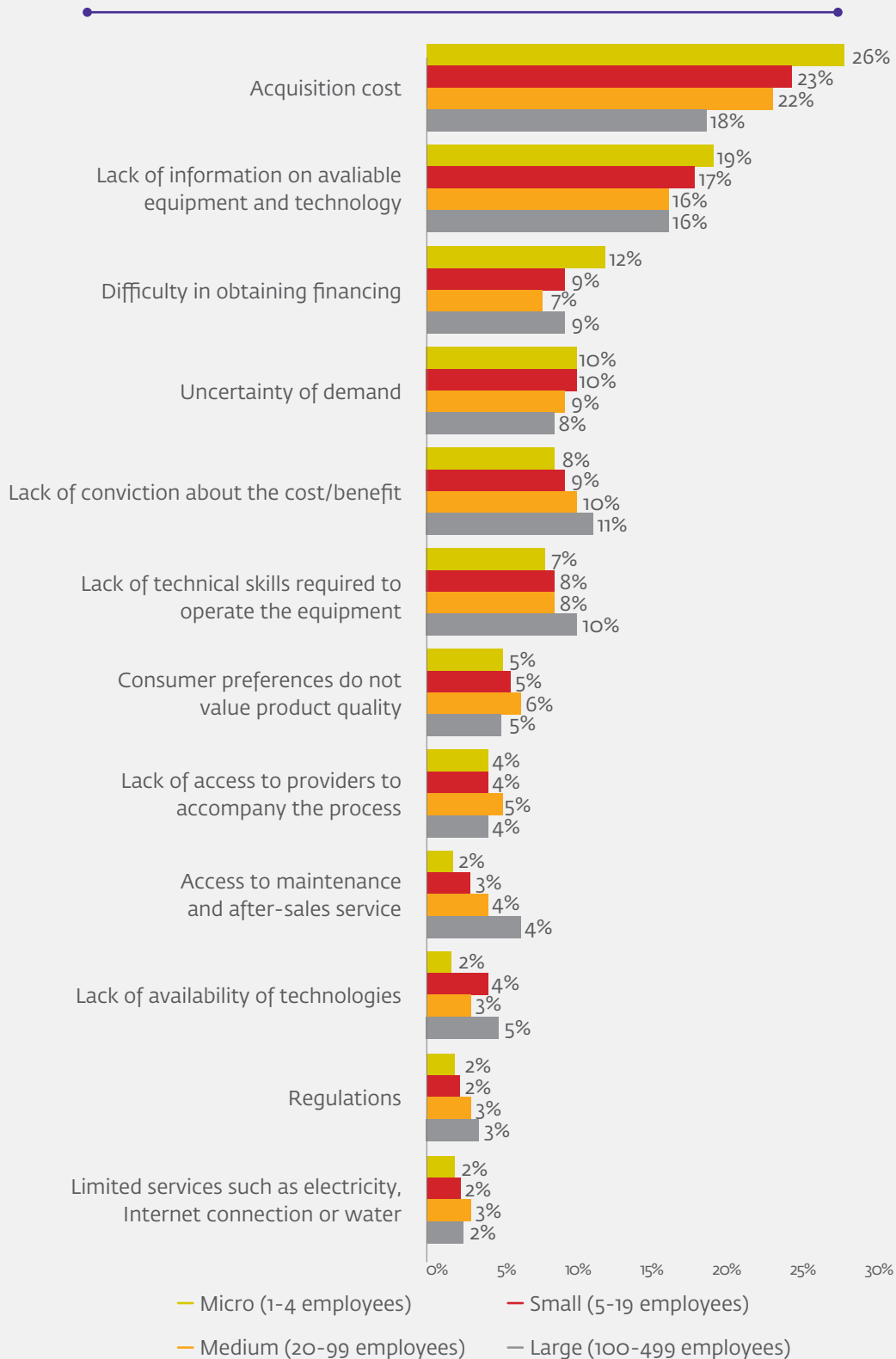


Figure D.17.

SOURCES FOR TECHNICAL ASSISTANCE TO APPLY TECHNOLOGY, MICRO AND SMALL FIRMS

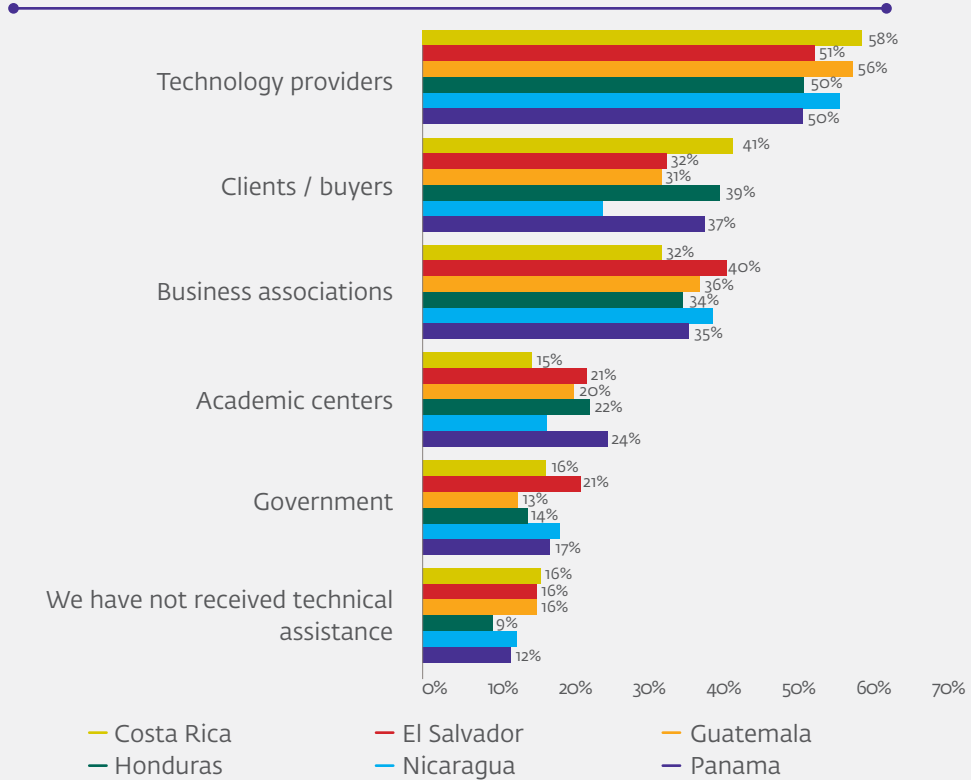


Figure D.18.

SOURCES FOR TECHNICAL ASSISTANCE TO APPLY TECHNOLOGY, MEDIUM AND LARGE FIRMS

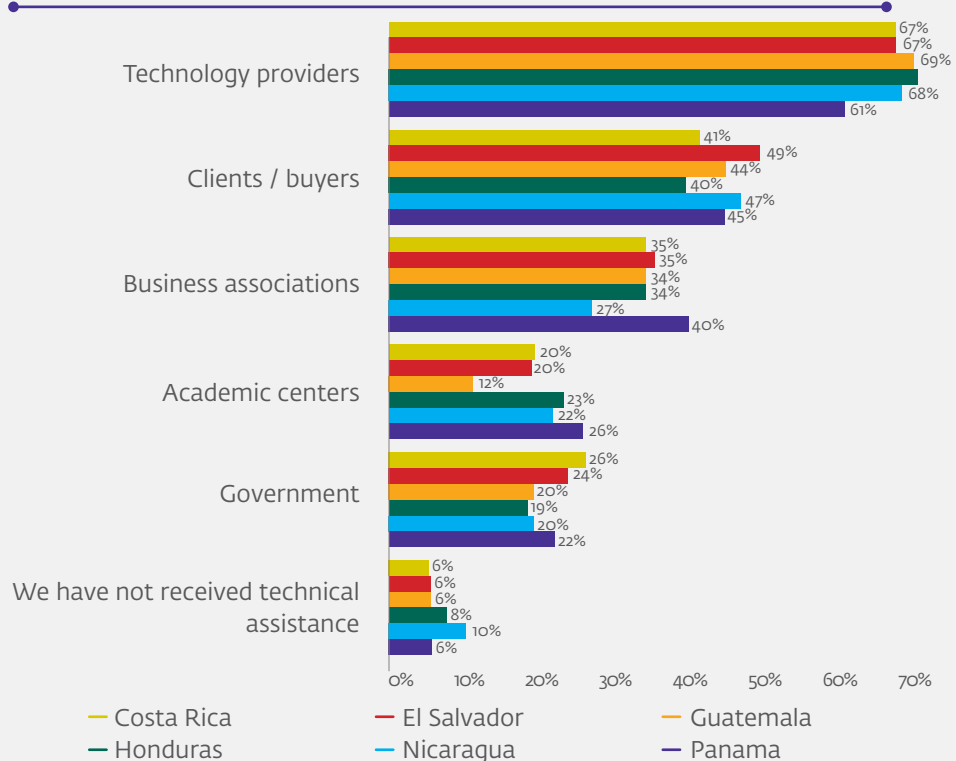


Figure D.19.

SUPPORT NEEDED TO ADOPT TECHNOLOGIES, MICRO AND SMALL FIRMS

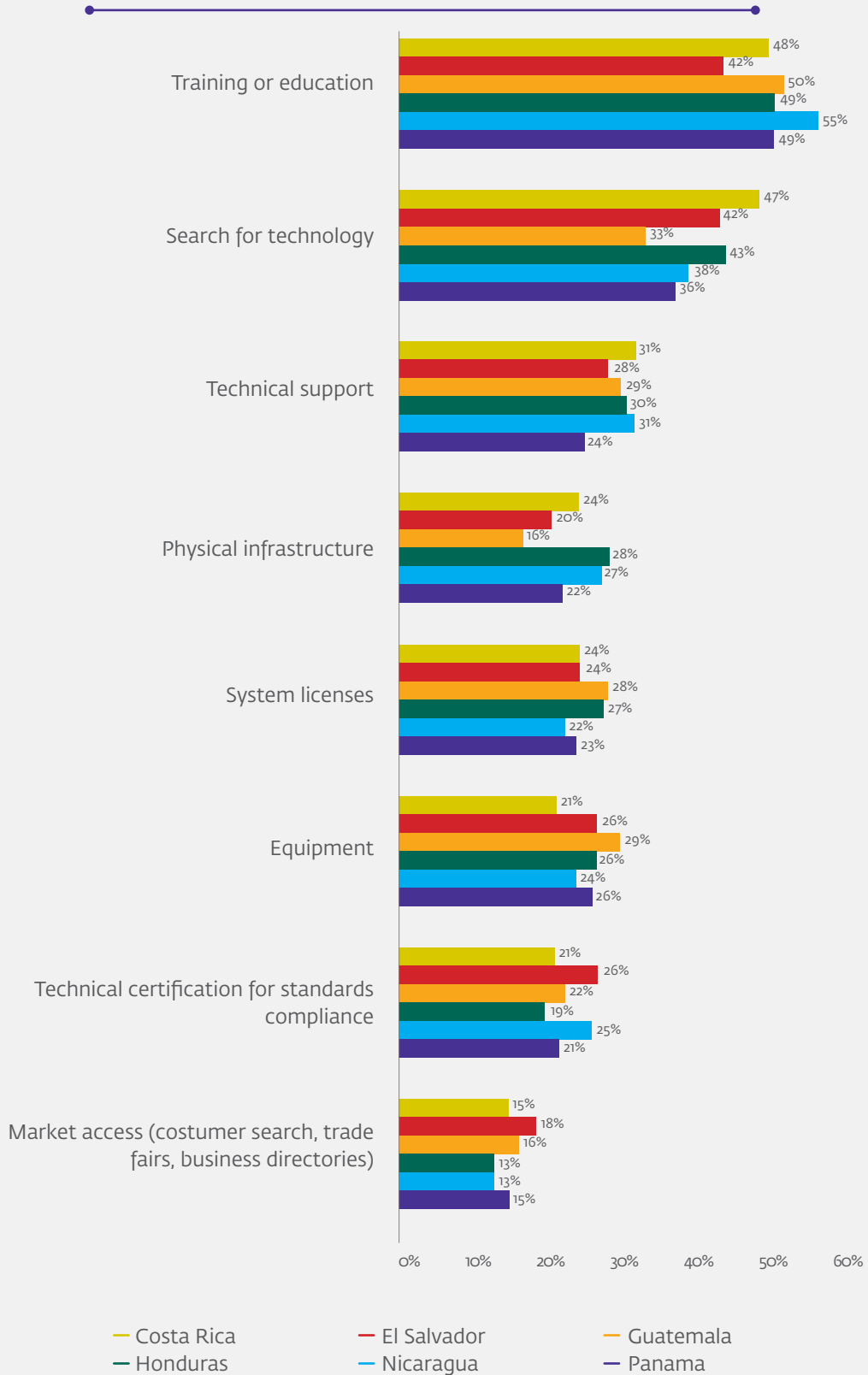
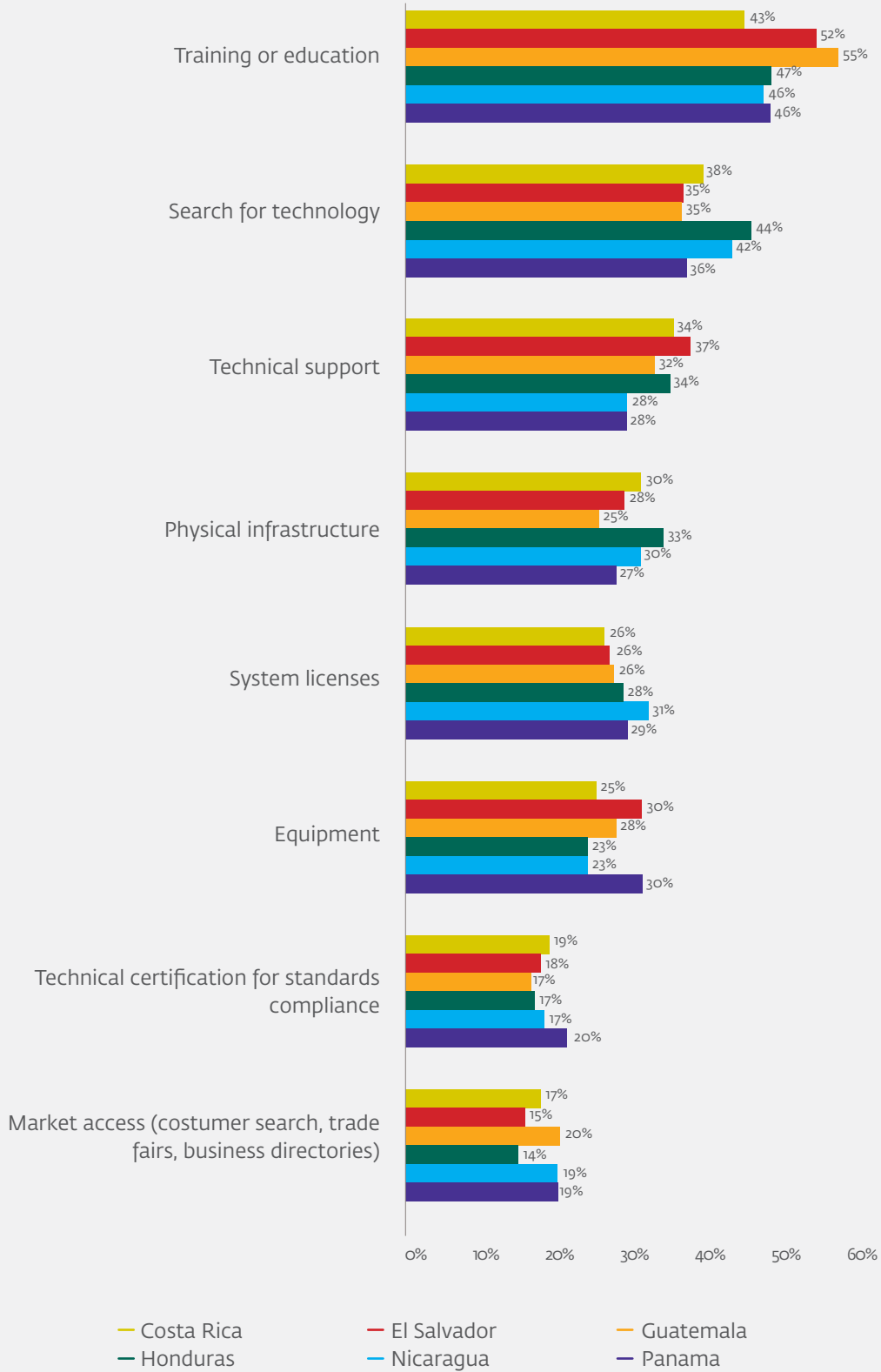
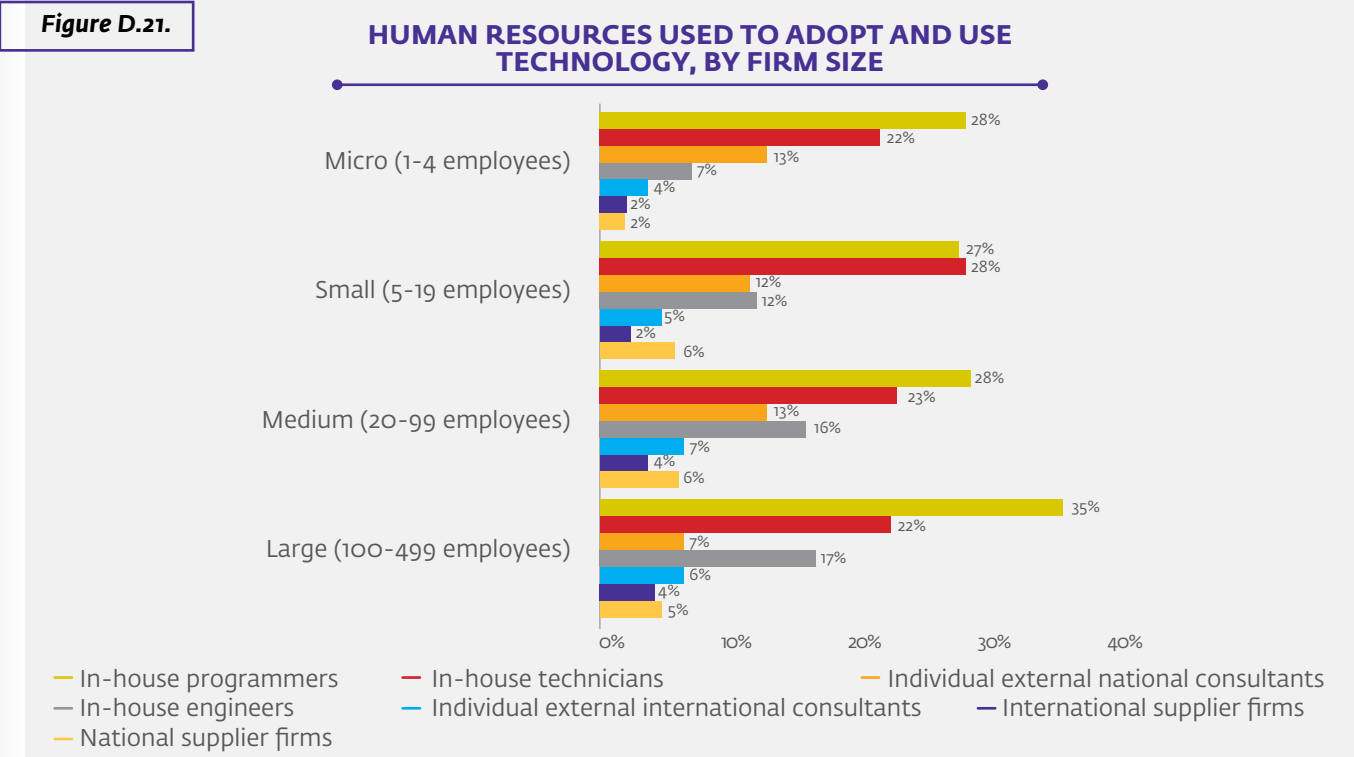


Figure D.20.

**SUPPORT NEEDED TO ADOPT TECHNOLOGIES,
MEDIUM AND LARGE FIRMS**



Another challenge to technology adoption is access to talent. Central American firms are hiring in-house technical capabilities to leverage and build on new technologies, such as engineers and programmers (Figure D.21). However, especially micro and small firms struggle to pay wages commanded by skilled applicants, while larger firms cite workforce skills gaps as a leading challenge to hire talent (Figure D.22).



Many firms across sectors see e-commerce as a transformative technology in their respective sectors. They cite a number of benefits from marketplaces to their businesses, such as greater access to customers, lower marketing costs, and more fluid access to payment and logistics services (Figure D.23). However, firms also cite high commissions charged by marketplaces and limited interoperability across marketplaces as limiting new gains (Figure D.24). Large firms also feel disconnected

from customers when using marketplaces and are concerned about the costs of developing talent to manage marketplaces.

These challenges could, in part, be alleviated.

Doing so would require capacity building and executive education-type programs for firms' leadership teams; channel management platforms that enable firms to easily manage their online channels; and, over time, digital identities that enable firms to be more easily authenticated across marketplaces and online services.

Figure D.23.

MAIN GAINS FROM THE USE OF MARKETPLACES, BY FIRM SIZE

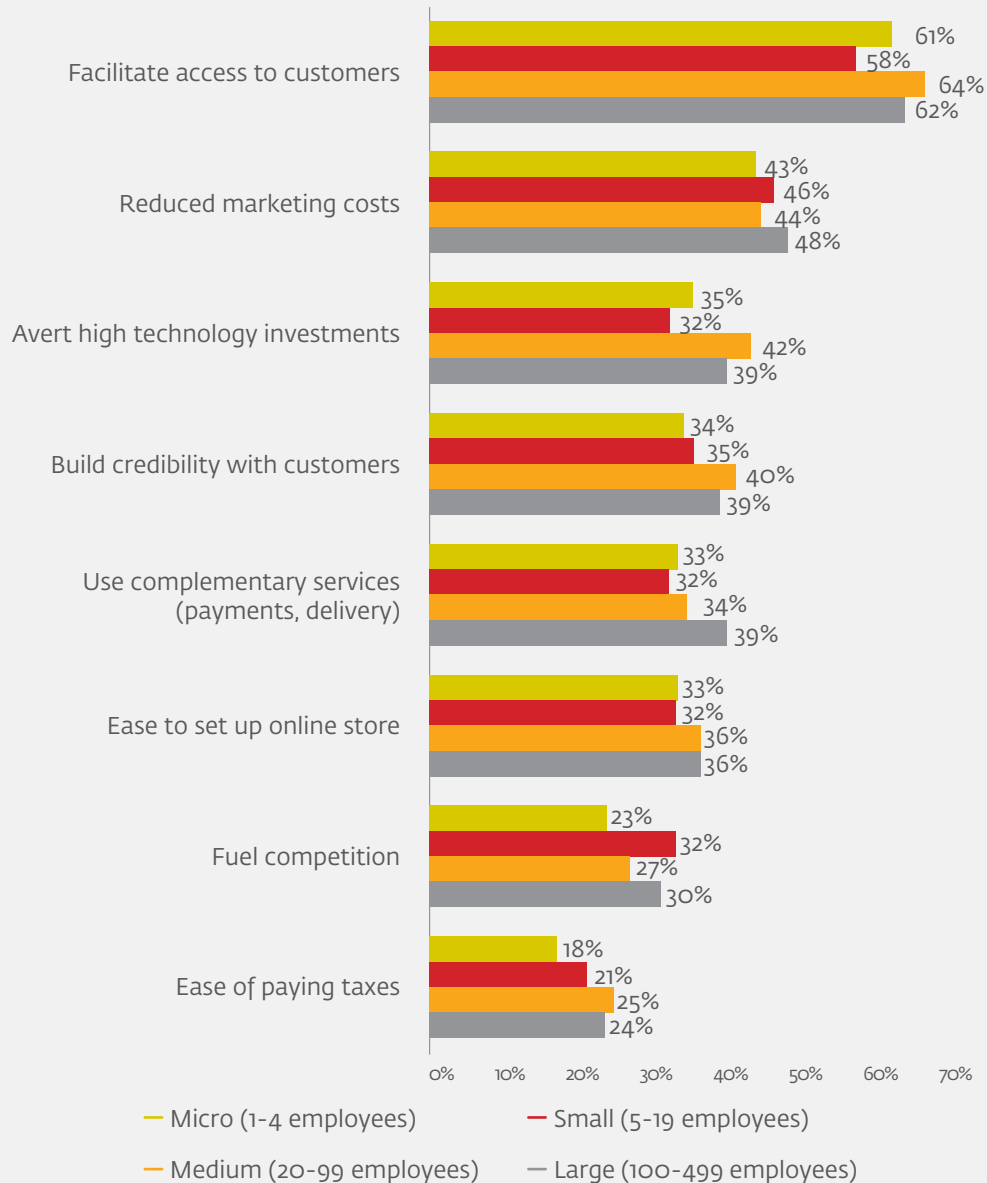
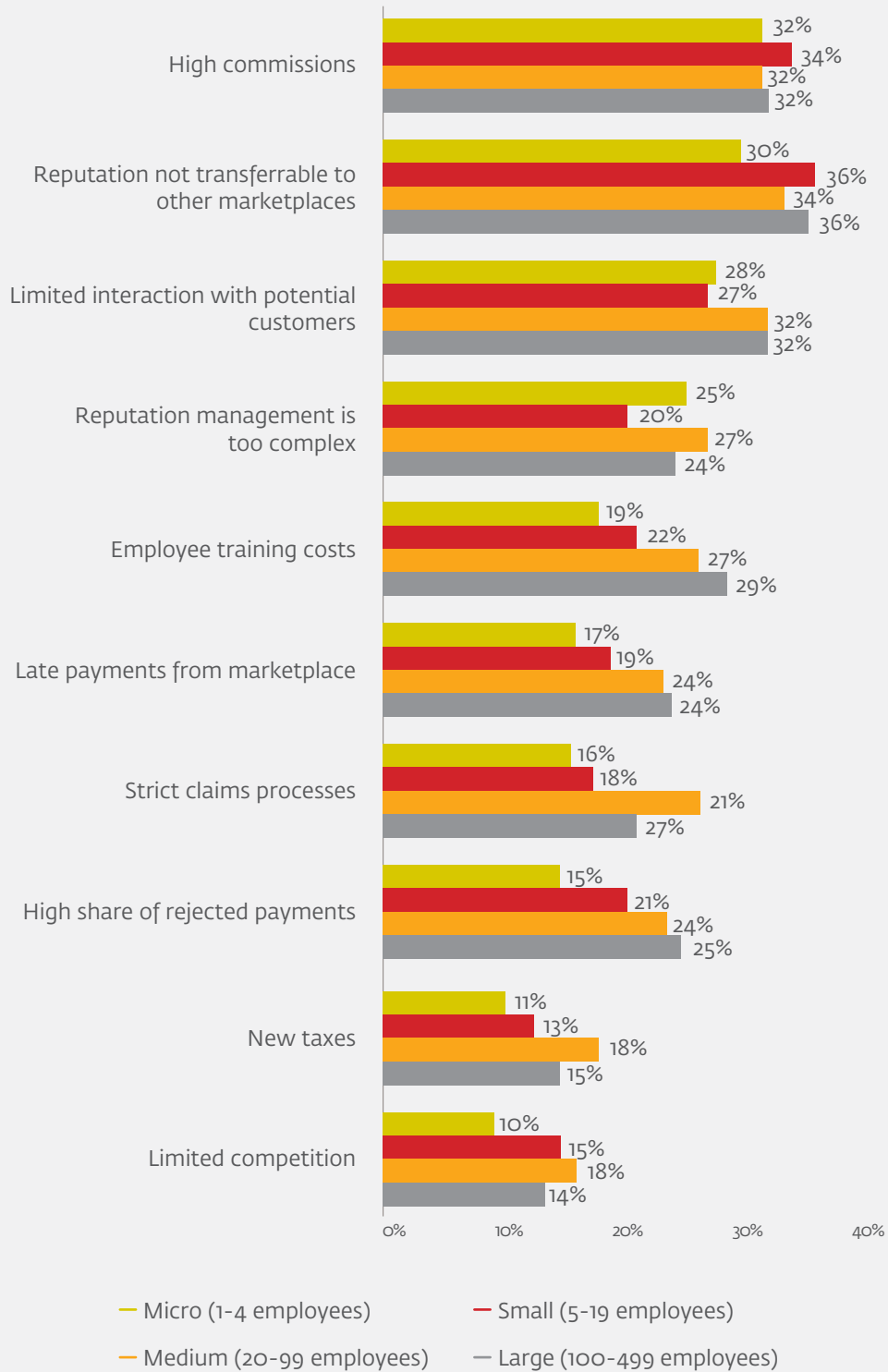


Figure D.24.

MAIN BARRIERS TO USE MARKETPLACES, BY FIRM SIZE



As the COVID-19 crisis has caused consumers to migrate online, there have been significant new opportunities for regional firms that are e-commerce-ready to grow their sales. However, while most firms have intensified their use of e-commerce (Figure D.25), the crisis has also surfaced gaps in economies' e-commerce readiness, such as long delivery times and supply and capacity constraints (Figure D.26).

Figure D.25.

PERCENTAGE OF FIRMS THAT HAVE INCREASED ONLINE SALES DUE TO COVID, BY SIZE

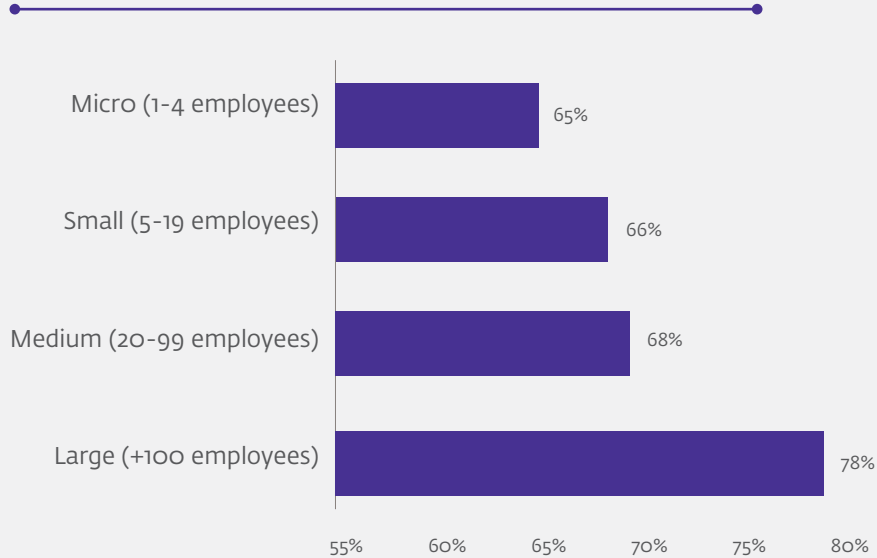
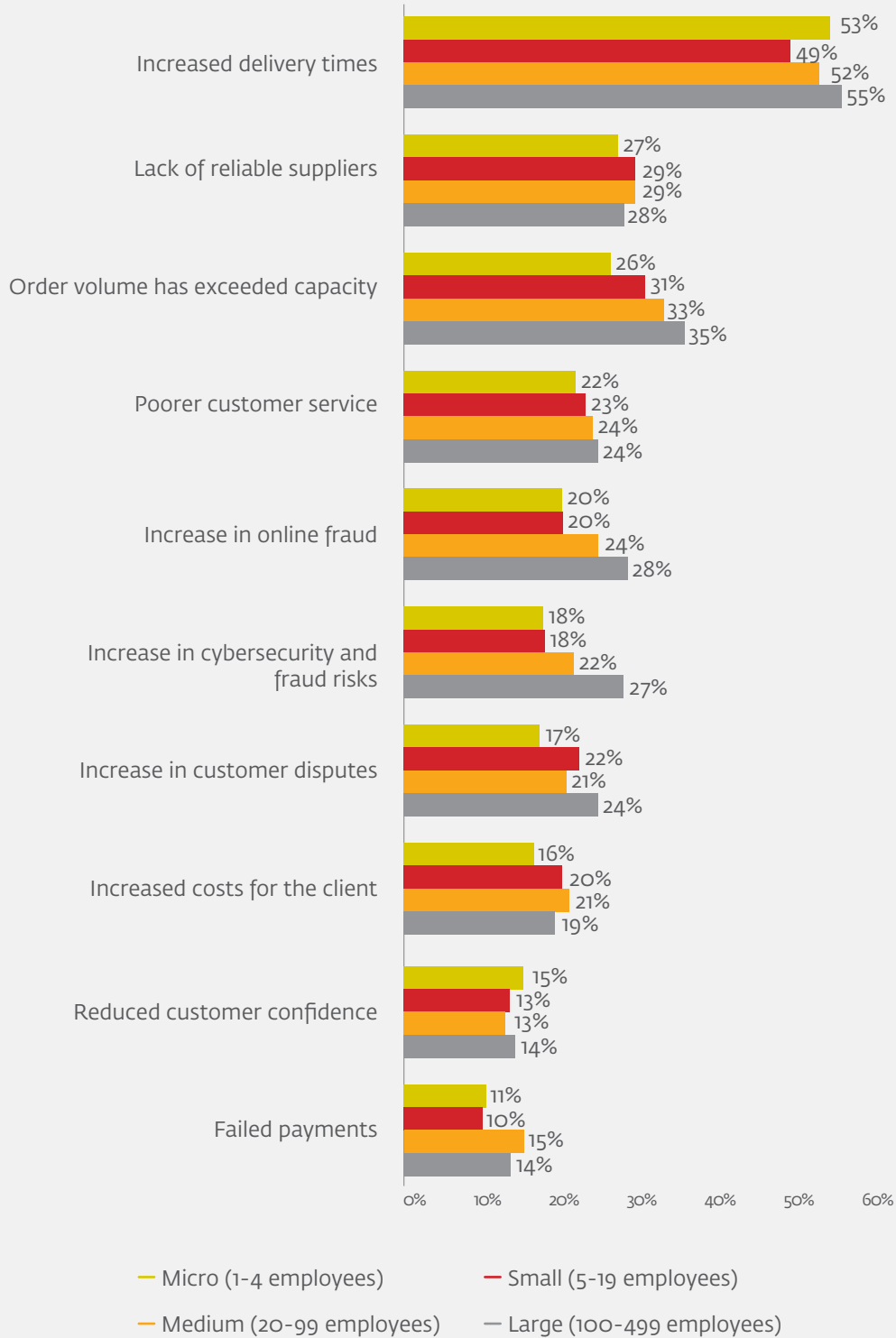


Figure D.26.

PERCENTAGE OF FIRMS THAT REPORT CHALLENGES TO SELLING ONLINE DURING COVID, BY SIZE



Payments are another opportunity and challenge for regional firms to gain new efficiencies and interact with customers. Especially online seller-exporters are embracing digital payments such as cards and e-wallets (Figure D.27) and have, to an extent, overcome their less digitized peers' concerns about payment fraud. Less digitized sellers that do not yet have online stores or presence on marketplaces worry about the security of e-wallets and mobile payments, suggesting a need for greater awareness-building for firms about digital transactions (Figure D.28).

Figure D.27.

PAYMENTS ACCEPTANCE METHODS, BY USE OF ONLINE CHANNELS

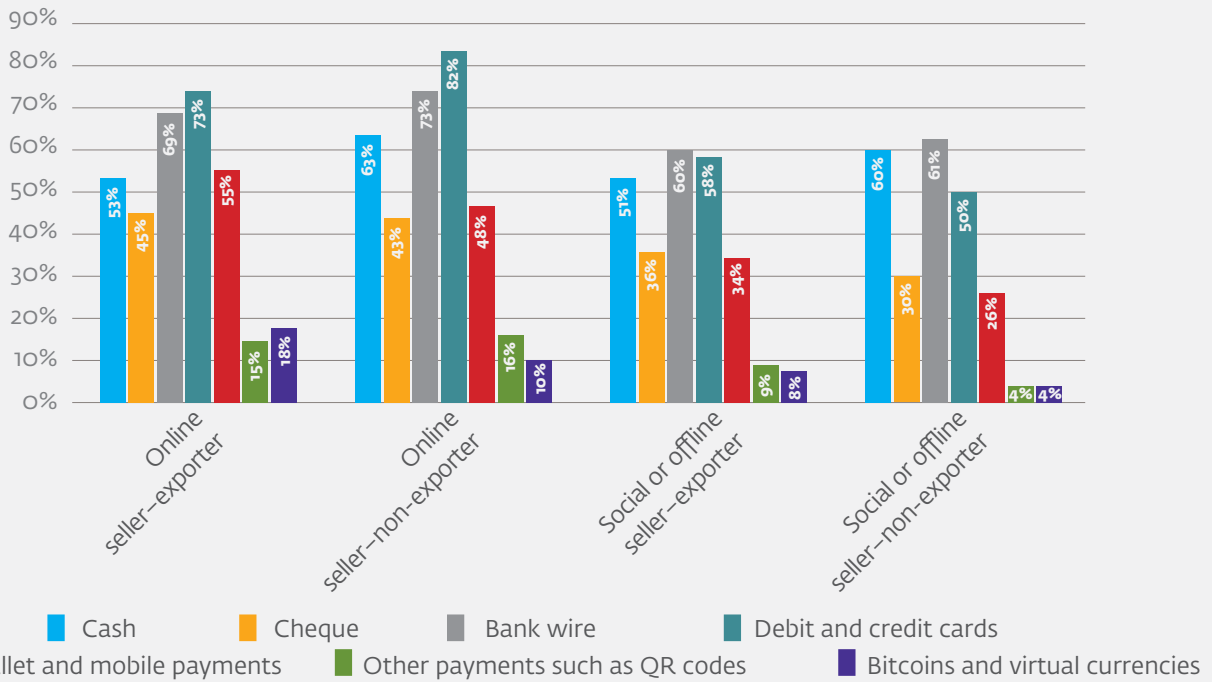
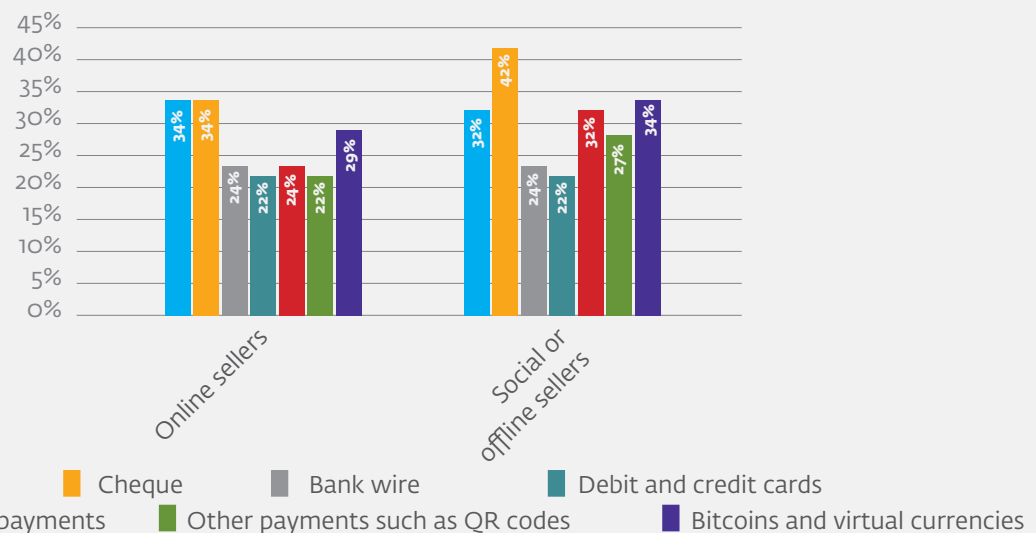


Figure D.28.

PERCENTAGE OF FIRMS CONCERNED WITH FRAUD, ONLINE VS. OFFLINE SELLERS



D.4 SUMMARY STATISTICS

Country	Sector	Size	Number of firms
Costa Rica	Agriculture (except livestock)	Micro (1-4 employees)	9
		Small (5-19 employees)	6
		Medium (20-99 employees)	7
		Large (100-499 employees)	7
	Business process outsourcing (BPO)	Micro (1-4 employees)	4
		Medium (20-99 employees)	1
		Large (100-499 employees)	6
	Financial services	Micro (1-4 employees)	8
		Small (5-19 employees)	10
		Medium (20-99 employees)	14
	Food processing	Large (100-499 employees)	3
		Micro (1-4 employees)	9
		Small (5-19 employees)	11
		Medium (20-99 employees)	12
	High-tech manufacturing	Large (100-499 employees)	15
		Micro (1-4 employees)	21
		Small (5-19 employees)	11
		Medium (20-99 employees)	11
	Light manufacturing	Large (100-499 employees)	32
		Micro (1-4 employees)	10
		Small (5-19 employees)	3
Medium (20-99 employees)		7	
Livestock (cattle, pigs, poultry)	Large (100-499 employees)	2	
	Micro (1-4 employees)	4	
	Small (5-19 employees)	7	
	Medium (20-99 employees)	8	
El Salvador	Agriculture (except livestock)	Micro (1-4 employees)	19
		Small (5-19 employees)	9
		Medium (20-99 employees)	7
		Large (100-499 employees)	5
	Business process outsourcing (BPO)	Micro (1-4 employees)	8
		Small (5-19 employees)	8
		Medium (20-99 employees)	6
		Large (100-499 employees)	7
	Financial services	Micro (1-4 employees)	21
		Small (5-19 employees)	25
		Medium (20-99 employees)	17
		Large (100-499 employees)	22
	Food processing	Micro (1-4 employees)	25
		Small (5-19 employees)	14
		Medium (20-99 employees)	16
		Large (100-499 employees)	12
	High-tech manufacturing	Micro (1-4 employees)	10
		Small (5-19 employees)	14
		Medium (20-99 employees)	14
		Large (100-499 employees)	26
	Light manufacturing	Micro (1-4 employees)	19
Small (5-19 employees)		16	
Medium (20-99 employees)		13	
Large (100-499 employees)		10	
Livestock (cattle, pigs, poultry)	Micro (1-4 employees)	8	
	Small (5-19 employees)	8	
	Medium (20-99 employees)	6	
	Large (100-499 employees)	3	
Guatemala	Agriculture (except livestock)	Micro (1-4 employees)	27
		Small (5-19 employees)	9
		Medium (20-99 employees)	7
		Large (100-499 employees)	13
	Business process outsourcing (BPO)	Micro (1-4 employees)	8
		Small (5-19 employees)	8
		Medium (20-99 employees)	35
		Large (100-499 employees)	35
	Financial services	Micro (1-4 employees)	27
		Small (5-19 employees)	27
		Medium (20-99 employees)	27
		Large (100-499 employees)	32
	Food processing	Micro (1-4 employees)	26
		Small (5-19 employees)	30
		Medium (20-99 employees)	25
		Large (100-499 employees)	25
	High-tech manufacturing	Micro (1-4 employees)	21
		Small (5-19 employees)	19
		Medium (20-99 employees)	14
		Large (100-499 employees)	18
	Light manufacturing	Micro (1-4 employees)	23
Small (5-19 employees)		13	
Medium (20-99 employees)		8	
Large (100-499 employees)		4	
Livestock (cattle, pigs, poultry)	Micro (1-4 employees)	10	
	Small (5-19 employees)	7	
	Medium (20-99 employees)	7	
	Large (100-499 employees)	2	

D.4 SUMMARY STATISTICS

Country	Sector	Size	Number of firms
Honduras	Agriculture (except livestock)	Micro (1-4 employees)	4
		Small (5-19 employees)	11
		Medium (20-99 employees)	13
		Large (100-499 employees)	7
	Business process outsourcing (BPO)	Small (5-19 employees)	5
		Medium (20-99 employees)	3
	Financial services	Micro (1-4 employees)	5
		Small (5-19 employees)	9
		Medium (20-99 employees)	8
	Food processing	Large (100-499 employees)	14
		Micro (1-4 employees)	25
		Small (5-19 employees)	7
		Medium (20-99 employees)	11
	High-tech manufacturing	Large (100-499 employees)	12
		Micro (1-4 employees)	2
		Small (5-19 employees)	10
		Medium (20-99 employees)	11
	Light manufacturing	Large (100-499 employees)	10
		Micro (1-4 employees)	11
		Small (5-19 employees)	3
		Medium (20-99 employees)	4
Livestock (cattle, pigs, poultry)	Large (100-499 employees)	5	
	Micro (1-4 employees)	4	
	Small (5-19 employees)	2	
	Medium (20-99 employees)	4	
Nicaragua	Agriculture (except livestock)	Large (100-499 employees)	2
		Micro (1-4 employees)	4
		Small (5-19 employees)	4
		Medium (20-99 employees)	3
	Business process outsourcing (BPO)	Large (100-499 employees)	1
		Micro (1-4 employees)	3
		Small (5-19 employees)	2
		Medium (20-99 employees)	3
	Financial services	Large (100-499 employees)	3
		Micro (1-4 employees)	2
		Small (5-19 employees)	3
		Medium (20-99 employees)	9
	Food processing	Large (100-499 employees)	13
		Micro (1-4 employees)	7
		Small (5-19 employees)	6
		Medium (20-99 employees)	3
	High-tech manufacturing	Large (100-499 employees)	6
		Micro (1-4 employees)	3
		Small (5-19 employees)	2
		Medium (20-99 employees)	5
	Light manufacturing	Large (100-499 employees)	3
Micro (1-4 employees)		2	
Small (5-19 employees)		4	
Medium (20-99 employees)		6	
Livestock (cattle, pigs, poultry)	Large (100-499 employees)	3	
	Micro (1-4 employees)	2	
	Small (5-19 employees)	5	
	Medium (20-99 employees)	1	
Panama	Agriculture (except livestock)	Large (100-499 employees)	13
		Micro (1-4 employees)	15
		Small (5-19 employees)	7
		Medium (20-99 employees)	7
	Business process outsourcing (BPO)	Large (100-499 employees)	6
		Micro (1-4 employees)	7
		Small (5-19 employees)	8
		Medium (20-99 employees)	10
	Financial services	Large (100-499 employees)	18
		Micro (1-4 employees)	18
		Small (5-19 employees)	30
		Medium (20-99 employees)	49
	Food processing	Large (100-499 employees)	22
		Micro (1-4 employees)	15
		Small (5-19 employees)	23
		Medium (20-99 employees)	22
	High-tech manufacturing	Large (100-499 employees)	16
		Micro (1-4 employees)	16
		Small (5-19 employees)	40
		Medium (20-99 employees)	48
	Light manufacturing	Large (100-499 employees)	13
Micro (1-4 employees)		9	
Small (5-19 employees)		11	
Medium (20-99 employees)		8	
Livestock (cattle, pigs, poultry)	Large (100-499 employees)	6	
	Micro (1-4 employees)	10	
	Small (5-19 employees)	10	
	Medium (20-99 employees)	6	

ANNEX E

SURVEY 2: DIGITAL SERVICE PROVIDERS

E.1 SAMPLE

This survey leveraged online survey methods and an online survey firm's proprietary panel of respondents. The online survey process differs from a traditional survey process in which the researcher draws up a sample frame of firms in a country and then randomly selects firms from it for what are typically phone interviews. The online survey method is scalable and is considerably more cost-effective than a phone interview or CATI. Prior attempts at combinations of CATIs based on a sample frame and scalable online surveys have resulted in strikingly similar patterns in firms' performance between the two sets (when comparing firms of the same size, sector, and geography). The method also allowed more easily reaching firms that were not at their physical offices and by their phones due to COVID-19.

There are some tradeoffs between online and traditional sampling methods. Online surveys inherently capture firms that are at least to an extent digitized so they can take the survey online and have self-selected to take a survey about the use of technology (thus likely going in knowing something about technology use). Hence, the sample, to an extent, over-represents firms that are more technology-intensive (and export-oriented, larger, and better performing). However, from experience, this does not markedly alter the general patterns of firm performance and technology adoption from what they are in a CATI

survey drawn from a sampling frame.

The survey used several measures to ensure quality.

The survey tracked the quality of responses in real-time, as respondents took the survey, through embedded questions detecting the survey takers' emotional state and through fingerprinting that combines IP address, device type, screen size, and cookies to ensure only unique panelists enter the survey. It maintains a fraud score on each respondent based on historical completions (completion time as a percentage of the stated length of the survey + any flagged poor completes) and bans those that breach a certain level; the company also uses invisible ReCaptcha to defend against bots.

The survey was performed 26 October 2020–17 January 2021, and the sample consists of 209 firms, of a total of 291 that started the survey. Thirty-seven percent are microenterprises with 1–4 employees, 22 percent are small firms with 5–19 employees, 24 percent are midsize firms with 20–99 employees, and the remaining 17 percent are large firms with more than 100 employees but fewer than 499 employees (Figure E.1). The largest samples are from Guatemala and El Salvador; the firms represent a wide range of target sectors (Figure E.2). A third are led by a female CEO; however, women are also prevalent in large male-led firms' management teams (Figure E.3 and Figure E.4). The surveyed firms are located both in the main urban centers and across provinces (Figure E.5).

Figure E.1.

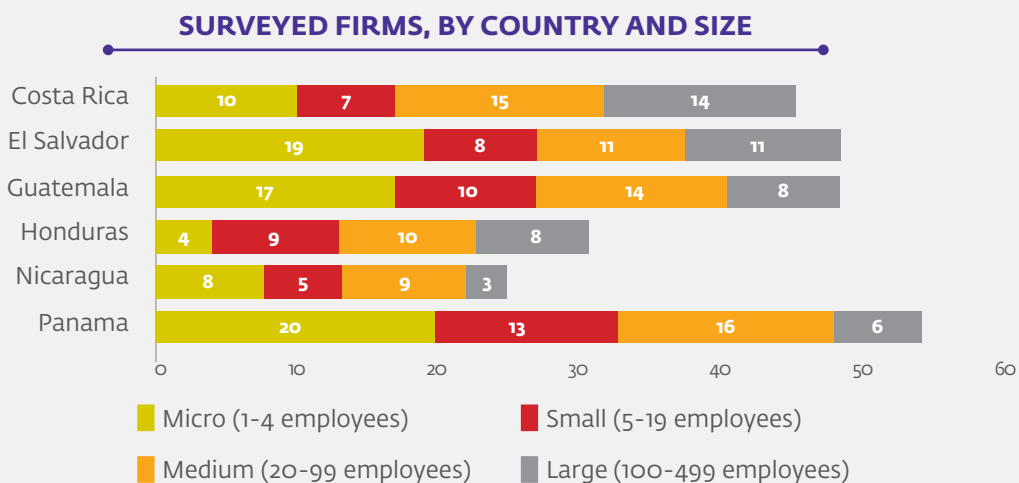


Figure E.2.

SURVEYED FIRMS BY ALL SECTORS SELECTED AND SIZE

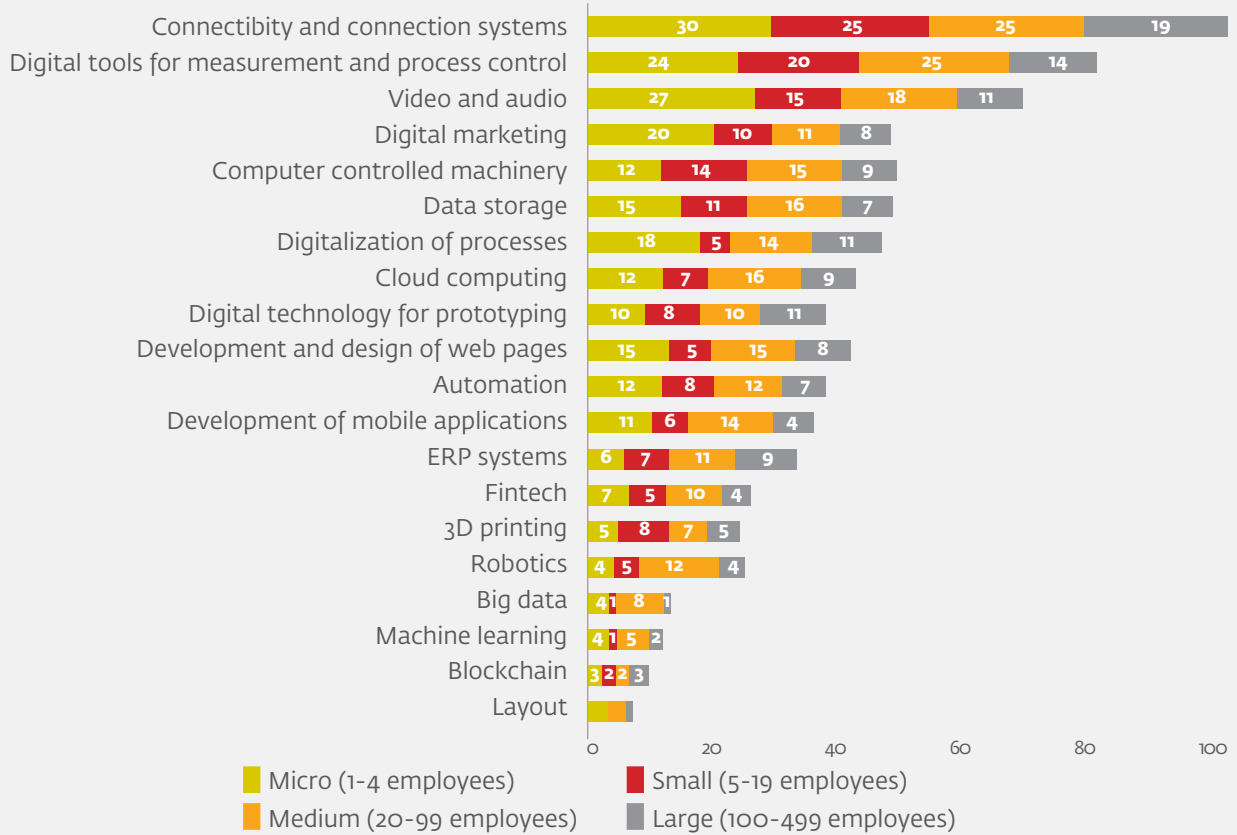


Figure E.3.

PERCENTAGE OF FIRMS BY GENDER OF CEO AND SECTOR

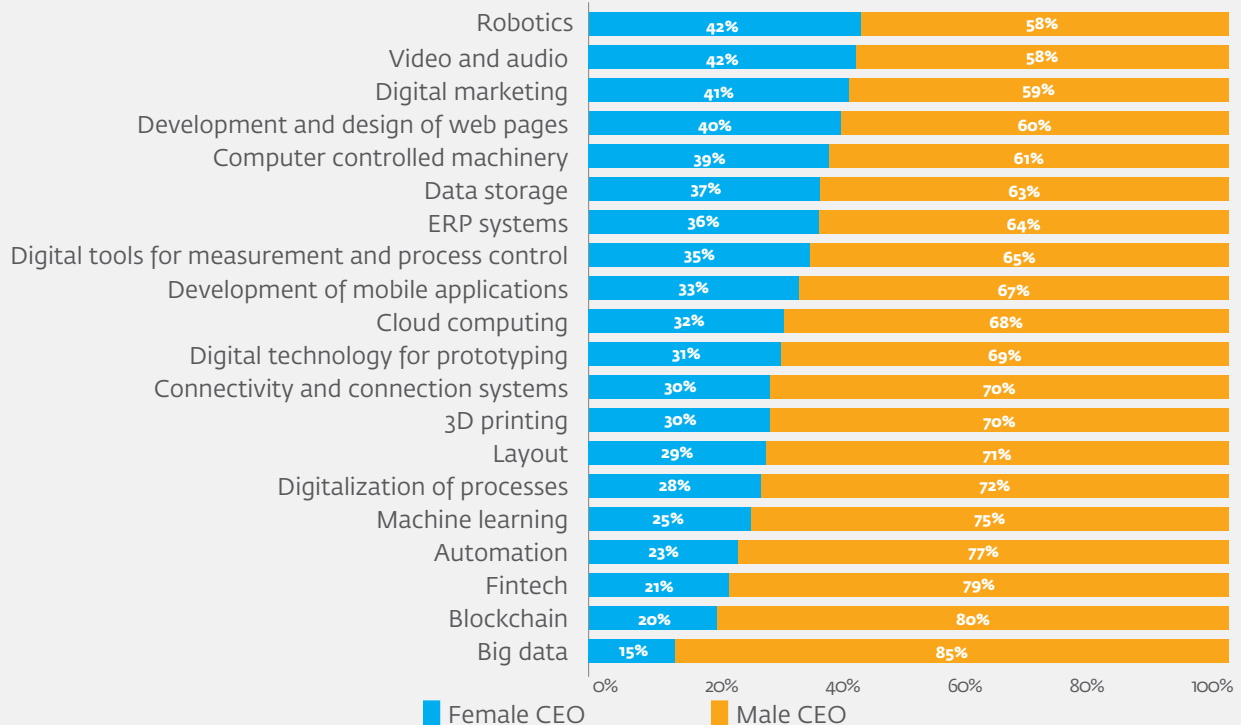


Figure E.4.

SURVEYED FIRMS BY GENDER OF CEO AND GENDER DISTRIBUTION OF MANAGEMENT TEAM

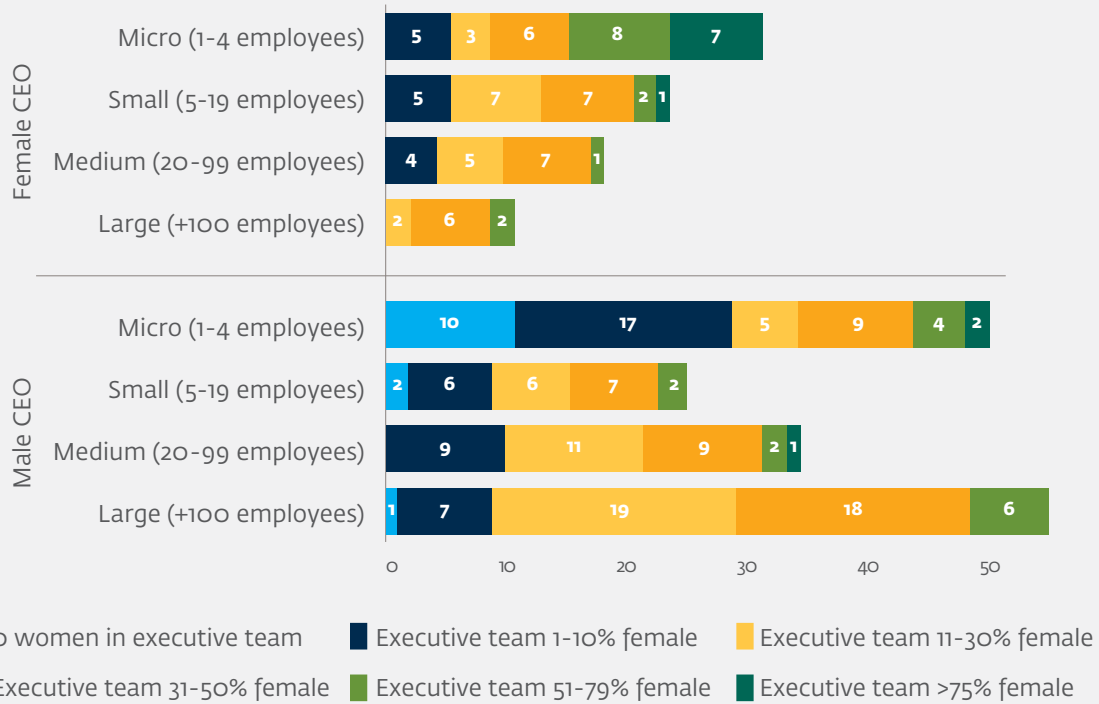
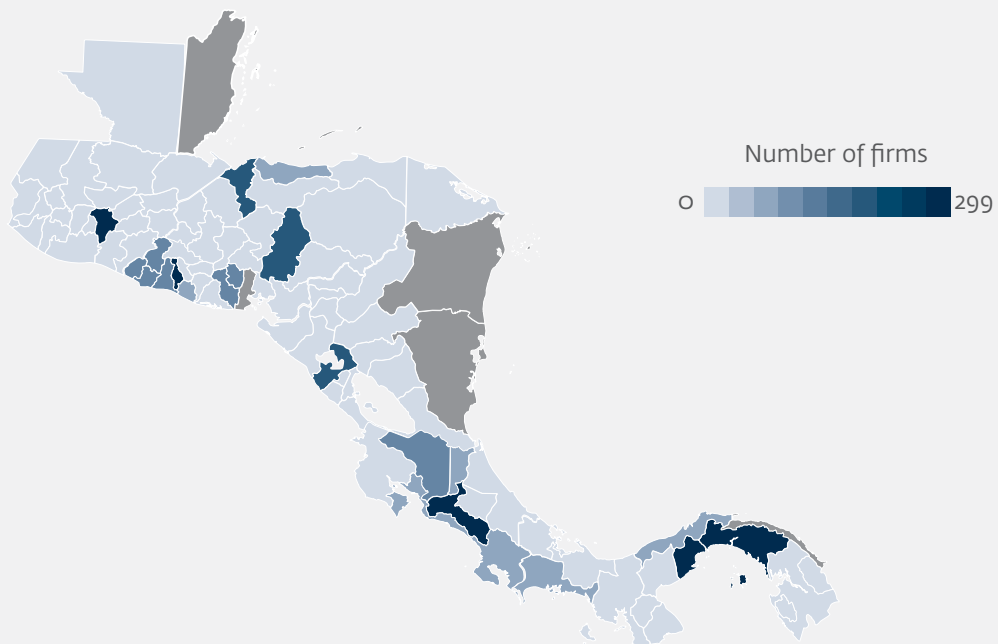


Figure E.5.

SURVEYED FIRMS BY PROVINCE/DEPARTMENT



E.2. HOW DO DIGITAL SERVICE PROVIDERS ACCESS AND USE TECHNOLOGIES?

Significant shares of digital services firms in all size categories are using broadband to connect online.

Larger firms also use fiberoptics and dial-up and satellite connections (Figure E.6). Firms, in general, report steady connections; few have experienced frequent service interruptions (Figure E.7).

Figure E.6.

PERCENTAGE OF FIRMS BY MAIN WAYS TO CONNECT TO THE INTERNET, BY FIRM SIZE

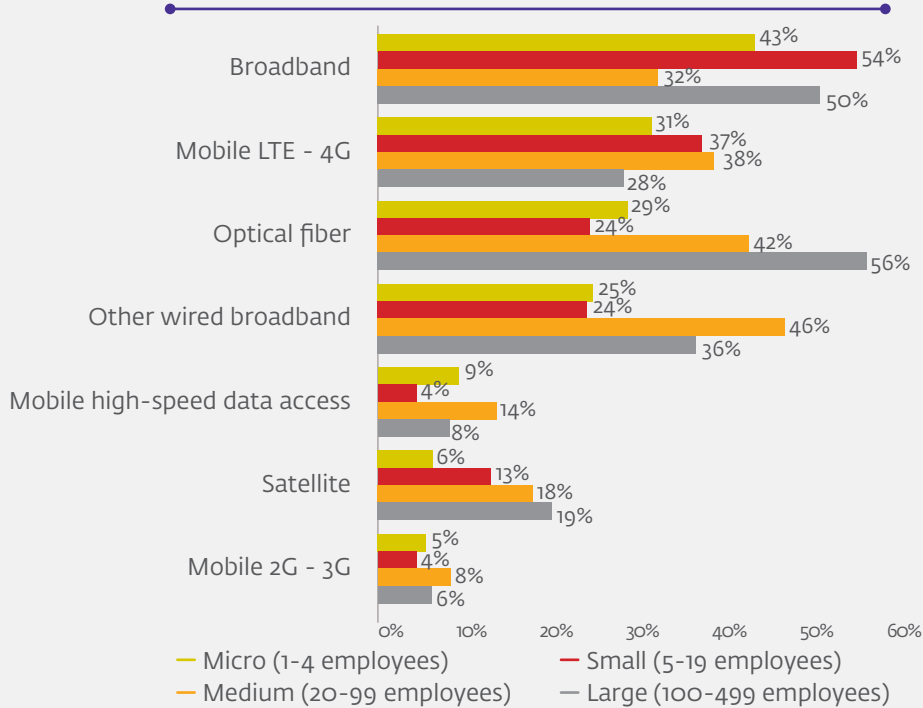
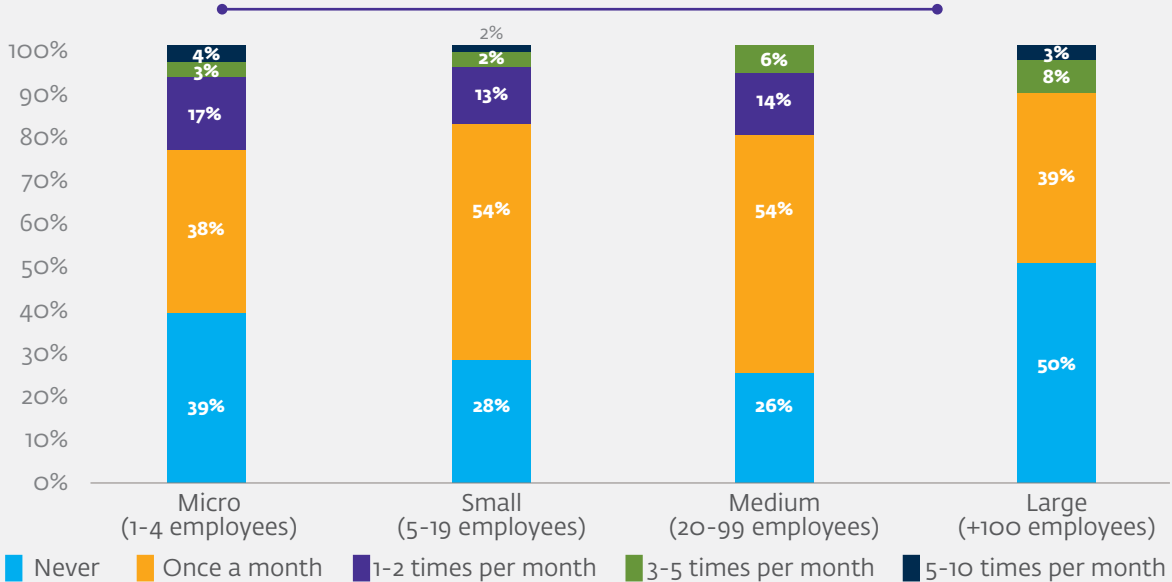


Figure E.7.

PERCENTAGE OF FIRMS EXPERIENCING SERVICE INTERRUPTIONS IN 2019



Asked about the main source of technologies they use, over a quarter reported leveraging open source technologies. However, a fifth, larger firms in particular, also use global services and their own developments (Figure E.8). Most firms across size categories learn about technologies from national technology suppliers; large firms also consult international suppliers and public programs (Figure E.9). To penetrate international markets, export-driven firms have used export promotion agencies and business associations for advice; non-exporters have mostly not received (or sought) assistance (Figure E.10).

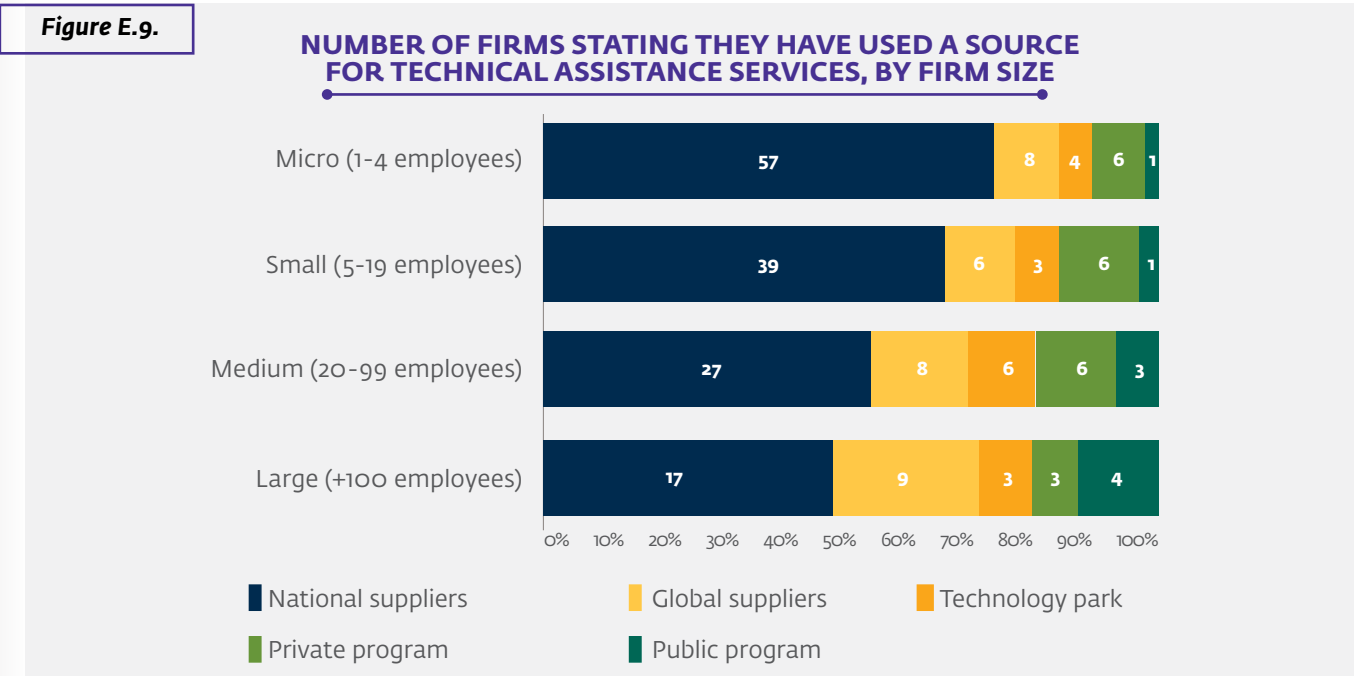
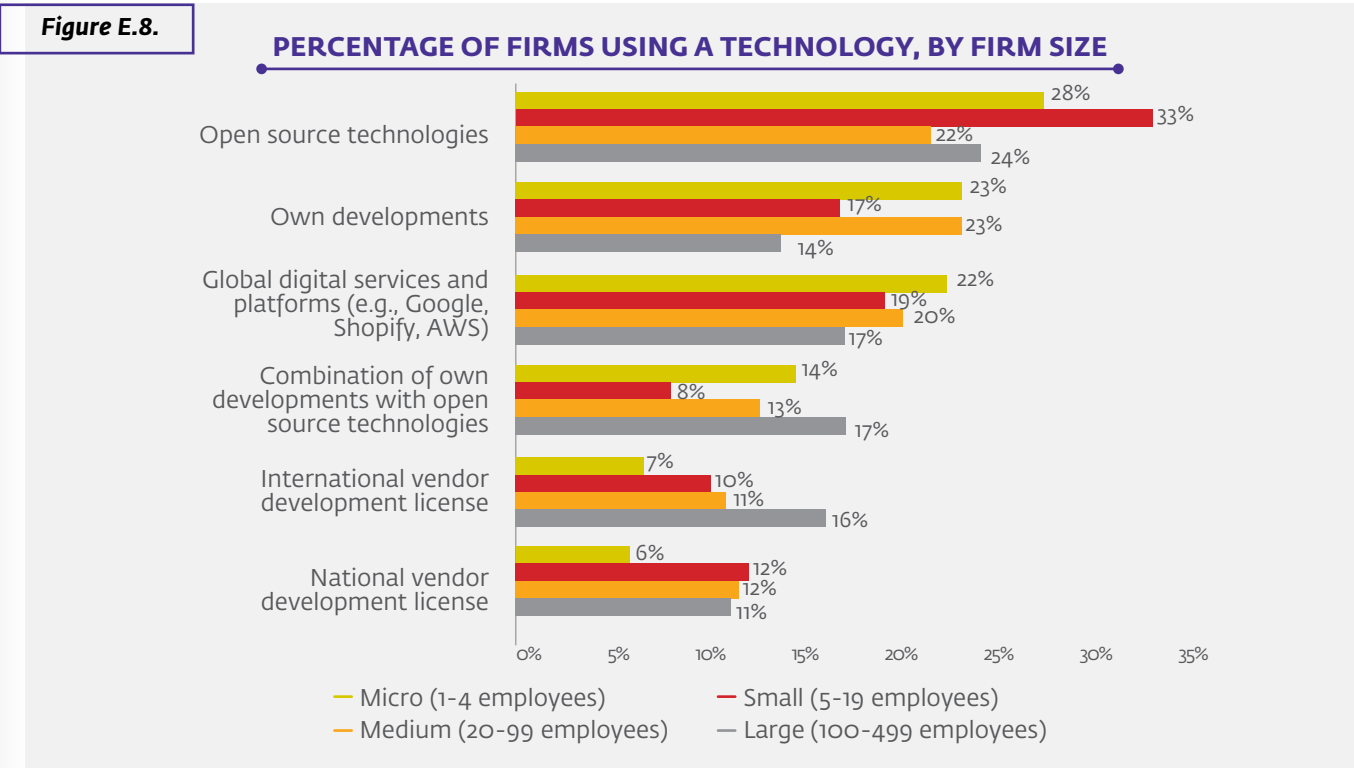
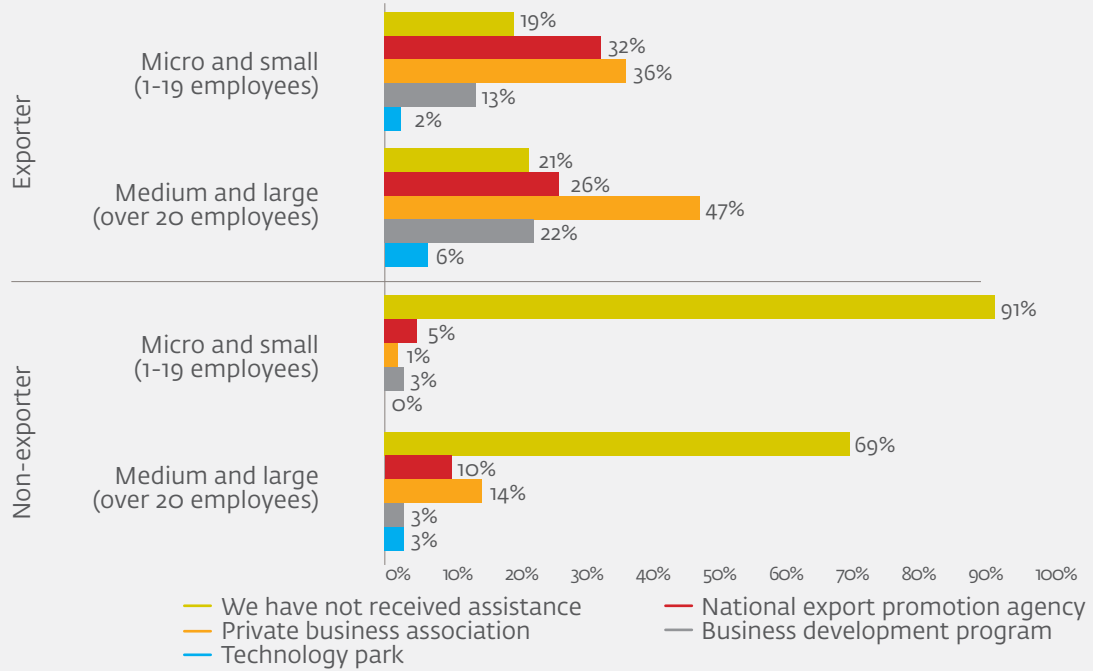


Figure E.10.

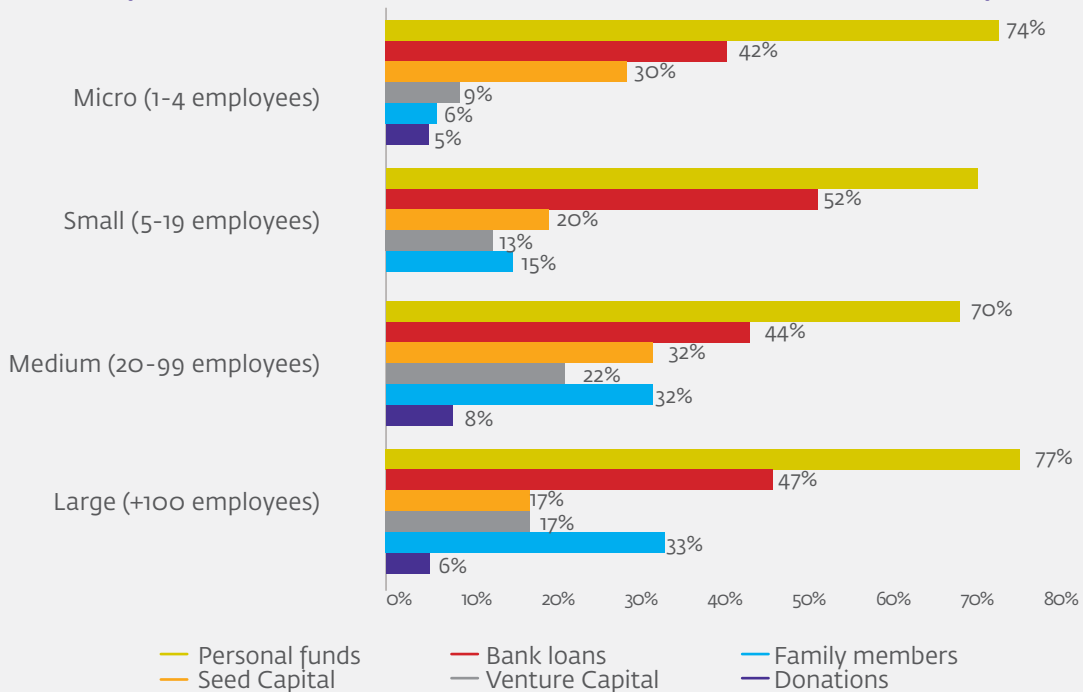
PERCENTAGE OF FIRMS USING A SOURCE FOR EXPORT ASSISTANCE, BY FIRM SIZE AND EXPORT PARTICIPATION



Most firms fund themselves and their technology adoptions with personal funds and bank loans. Some larger firms have been able to avail themselves of venture capital as well (Figure E.11). There are few differences between firms run by female CEO as opposed to male CEOs in the use of these sources.

Figure E.11.

PERCENTAGE OF FIRMS STATING THEY HAVE USED A SOURCE OF FINANCING, BY FIRM SIZE



E.3. MAIN CHALLENGES TO THE PROVISION OF DIGITAL SERVICES

Firms see business registration processes, taxes, and concerns around intellectual property protections and cybersecurity as the main challenges for the use of digital services in their countries. (See Figure E.12.) They perceive high competition and limited scale of markets as constraints on efforts to scale and expand to new markets (Figure E.13). Firms also face challenges in recruiting talent due to perceived workforce skills gaps (Figure E.14) and anticipate stiffer competition amid limited demand in 2021 (Figure E.15).

Figure E.12.

PERCENTAGE OF MICRO AND SMALL FIRMS CITING BARRIERS TO DIGITAL SERVICES IN THEIR COUNTRY

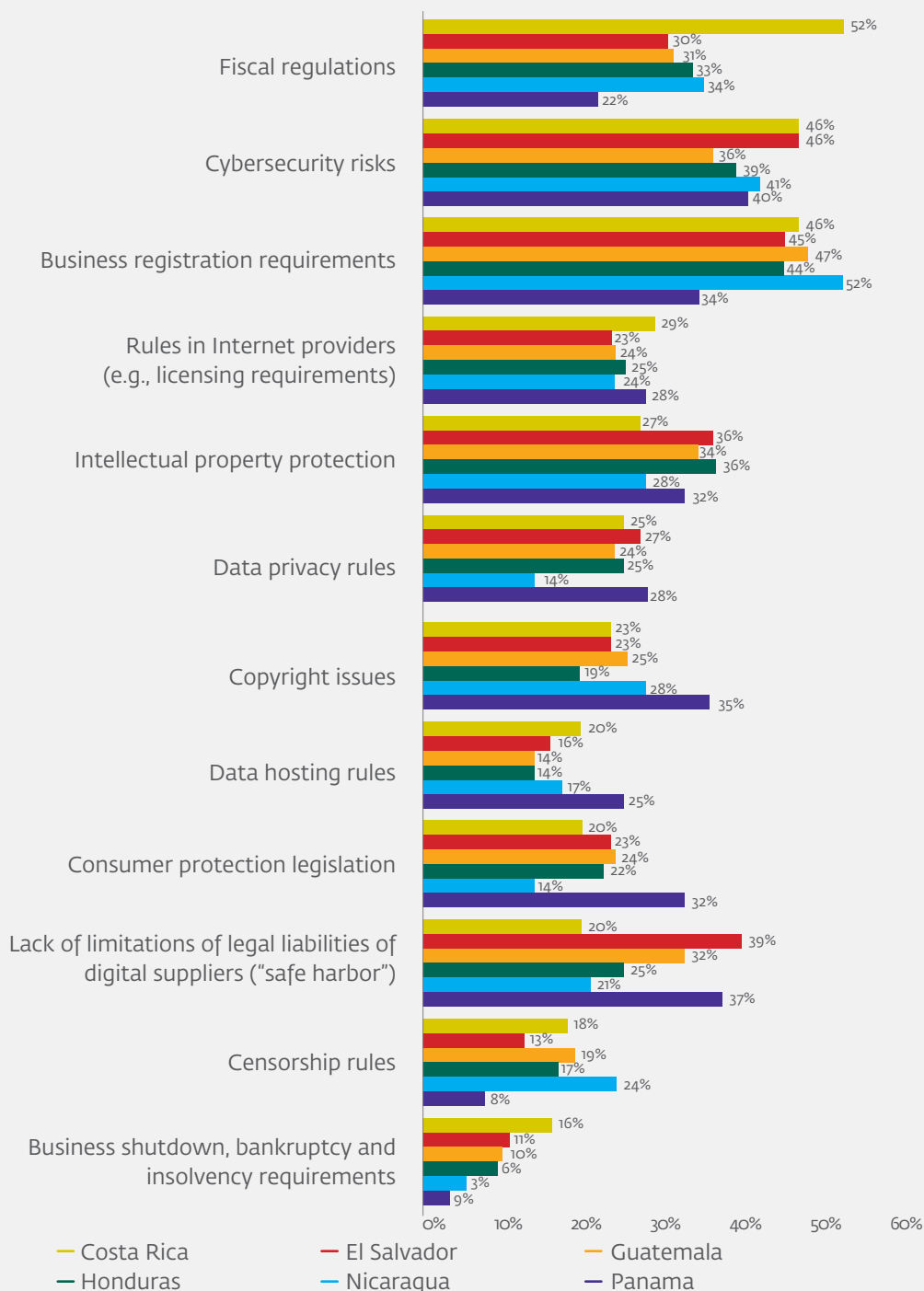


Figure E.13.

PERCENTAGE OF SURVEYED FIRMS CITING BARRIERS TO EXPANDING TO NEW MARKETS, BY COUNTRY

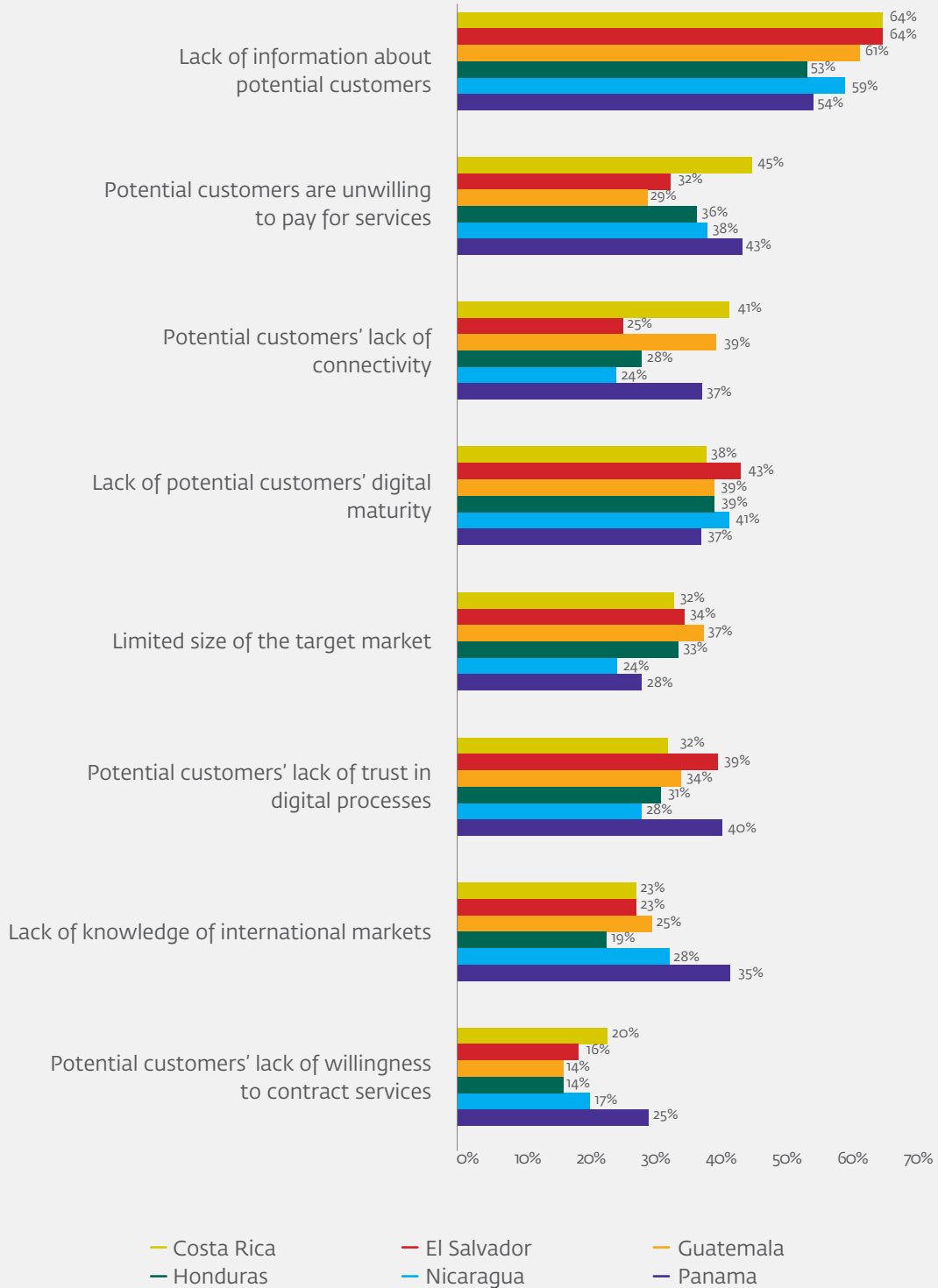


Figure E.14.

MAIN CHALLENGES TO HIRE TALENT, BY FIRM SIZE

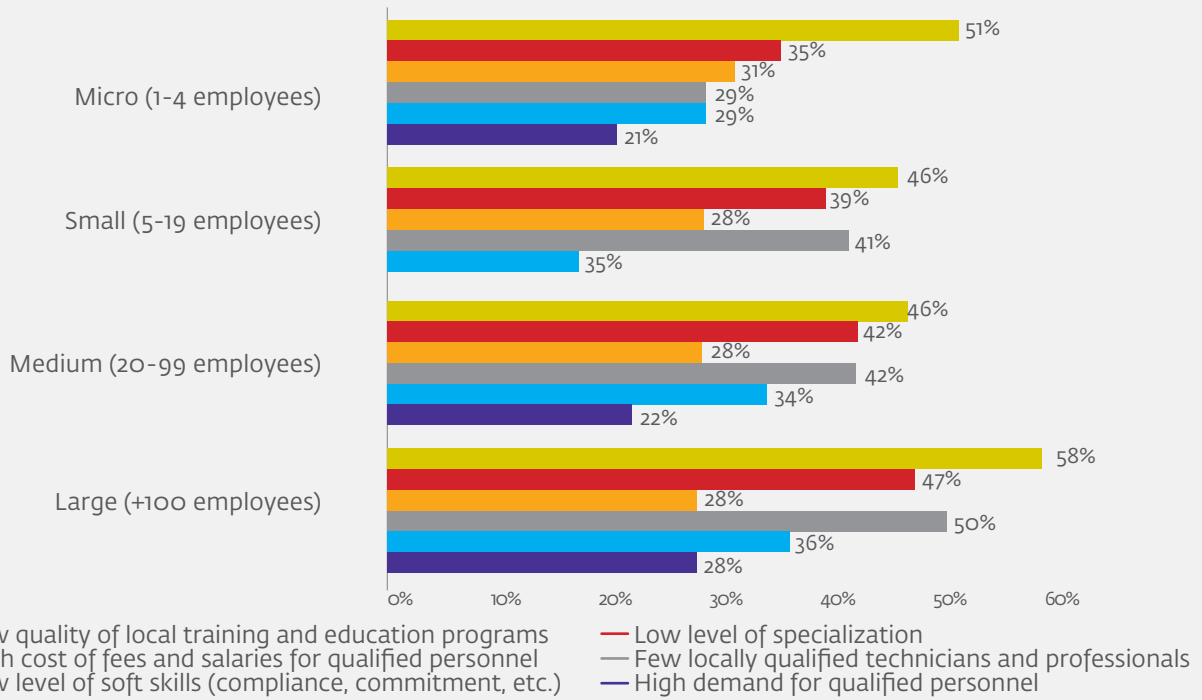
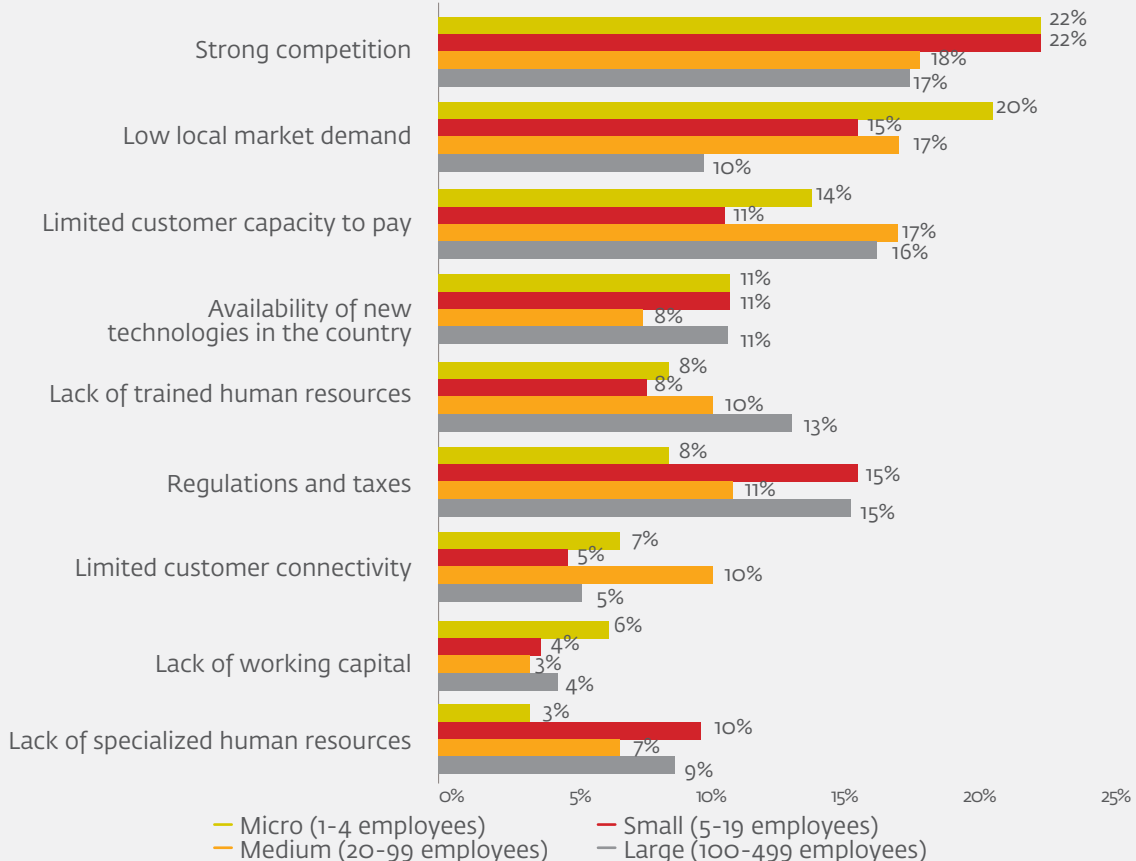


Figure E.15.

ANTICIPATED MAIN CONSTRAINTS ON SALES GROWTH IN 2021, BY FIRM SIZE



E.4. SUMMARY STATISTICS

Country	Size	All firms	Digital tools for measurement and process control	Connectivity and connection systems	ERP systems	Financial services	Computer controlled machinery	Digital technology for prototyping	3D printing	Digitalization of processes	Automation
Costa Rica	Micro (1-4 employees)	10	3	4	1	0	2	4	1	1	2
	Small (5-19 employees)	5	2	3	2	0	4	3	1	0	0
	Medium (20-99 employees)	8	1	3	1	1	3	0	1	0	2
	Large (100-499 employees)	12	4	9	1	2	3	4	2	6	6
El Salvador	Micro (1-4 employees)	18	8	9	2	1	2	1	1	3	0
	Small (5-19 employees)	6	2	3	0	0	0	0	0	1	1
	Medium (20-99 employees)	4	2	1	2	1	1	1	0	1	1
	Large (100-499 employees)	6	2	3	0	0	1	0	0	1	0
Guatemala	Micro (1-4 employees)	17	10	9	5	3	5	3	2	4	2
	Small (5-19 employees)	9	5	3	0	3	2	0	1	0	1
	Medium (20-99 employees)	8	4	2	2	0	1	4	0	4	3
	Large (100-499 employees)	4	1	3	0	1	0	0	0	0	0
Honduras	Micro (1-4 employees)	4	3	1	1	1	0	0	0	1	0
	Small (5-19 employees)	9	1	5	1	0	3	0	1	2	0
	Medium (20-99 employees)	7	4	5	0	0	1	1	1	1	1
	Large (100-499 employees)	6	1	4	1	4	1	4	1	3	4
Nicaragua	Micro (1-4 employees)	8	1	5	1	0	3	0	0	1	0
	Small (5-19 employees)	4	0	3	0	0	0	0	0	2	1
	Medium (20-99 employees)	7	4	3	1	3	3	2	1	4	3
	Large (100-499 employees)	2	0	0	1	0	0	0	0	0	0
Panama	Micro (1-4 employees)	20	9	9	8	5	7	7	3	4	6
	Small (5-19 employees)	13	5	6	3	3	5	4	3	1	3
	Medium (20-99 employees)	16	6	11	2	2	4	5	3	5	6
	Large (100-499 employees)	6	2	3	1	0	0	0	1	0	0

Country	Size	All firms	Robotics	Blockchain	Machine learning	Cloud technology (cloud computing)	Big data	Data storage	Layout	Video and audio	Mobile apps	Web design	Digital marketing
Costa Rica	Micro (1-4 employees)	10	1	0	0	2	1	1	0	2	0	1	0
	Small (5-19 employees)	5	0	0	0	2	0	3	0	2	2	1	4
	Medium (20-99 employees)	8	1	0	1	3	0	1	0	4	2	3	3
	Large (100-499 employees)	12	2	1	0	3	1	2	0	5	4	3	3
El Salvador	Micro (1-4 employees)	6	0	0	0	1	0	1	0	3	2	1	1
	Small (5-19 employees)	4	1	1	1	1	1	1	1	2	1	1	2
	Medium (20-99 employees)	6	0	0	1	1	1	0	0	2	2	2	2
	Large (100-499 employees)	17	2	0	0	4	2	5	1	8	3	2	6
Guatemala	Micro (1-4 employees)	9	0	0	0	1	1	2	0	3	1	1	0
	Small (5-19 employees)	8	2	0	2	1	1	2	1	1	1	3	4
	Medium (20-99 employees)	4	0	0	0	1	0	2	0	2	1	1	1
	Large (100-499 employees)	4	0	0	0	1	0	1	0	1	0	0	1
Honduras	Micro (1-4 employees)	9	1	0	0	2	1	3	0	1	2	1	3
	Small (5-19 employees)	7	1	0	0	1	0	3	1	3	2	3	1
	Medium (20-99 employees)	6	3	2	1	5	2	2	0	3	3	2	3
	Large (100-499 employees)	8	2	0	0	1	1	2	0	3	1	0	0
Nicaragua	Micro (1-4 employees)	4	2	0	0	1	1	2	0	3	1	0	0
	Small (5-19 employees)	7	3	2	1	2	2	4	1	3	2	3	4
	Medium (20-99 employees)	2	0	0	0	0	0	0	0	0	0	0	0
	Large (100-499 employees)	20	2	1	2	3	3	4	2	10	5	7	3
Panama	Micro (1-4 employees)	13	0	0	0	3	0	2	0	2	0	5	2
	Small (5-19 employees)	16	2	1	3	4	2	4	1	3	1	2	4
	Medium (20-99 employees)	6	1	0	0	1	0	2	0	2	1	1	3
	Large (100-499 employees)	10	1	0	0	2	1	1	0	2	0	1	0

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