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Assessing the Dominican Republic's Readiness to Play a Greater Role in Global Semiconductor and PCB Value Chains

STEPHEN EZELL I JANUARY 2024

The Dominican Republic is one of the world's fastest-growing economies, offers perhaps the most attractive business environment in Latin America, and is a leading candidate for nearshored investments in advanced manufacturing activity—particularly for electronics such as printed circuit boards (PCBs) and the assembly, test, and packaging (ATP) of semiconductors.

KEY TAKEAWAYS

- Geopolitical tensions, supply chain disruptions, and rising Asian production costs are driving a reorganization of global value chains in high-technology industries, with the Dominican Republic well positioned to attract such nearshored investment.
- The Dominican Republic has grown at an almost 5 percent annual rate over the past half century, transforming it into Latin America's seventh-largest economy and positioning it to graduate from middle-income to advanced-economy status by 2060.
- The Dominican Republic's 87 free zones (FZs), which exempt exporters from paying 100 percent of income tax (and a range of other taxes), make the country a regional powerhouse in the production and export of electronics and medical devices.
- The 25 leading electronics manufacturers operating in the Dominican Republic's FZs provide a well-developed advanced electronics manufacturing base to serve as a springboard for the country getting into semiconductor ATP and PCB manufacturing.
- The Dominican Republic's "Bureaucracy Zero" program, which seeks to enhance public administration efficiency through clear and appropriate regulatory frameworks, has recently streamlined 315 procedures operated by 63 government institutions.
- The Dominican Republic's flagship workforce training program, the National Institute of Professional Technical Training, or "INFOTEP," equips the country with the mechanism needed to train a larger workforce to support advanced electronics manufacturing.

EXECUTIVE SUMMARY

The global economy is currently undergoing a dramatic reordering, driven by a multitude of factors including COVID-19 pandemic-induced supply chain disruptions; the emergence of breakthrough digital technologies such as artificial intelligence (AI); and geopolitical tensions, not least between the United States and China. In a quest to enhance the stability, resilience, and cost-competitiveness of their supply chains, advanced electronics manufacturers are considering alternative production locations worldwide, presenting nations with a unique opportunity to present their distinctive value propositions to attract globally mobile investment in an international economy that's reorganizing in real time.

In few sectors is this opportunity greater than in semiconductors, an industry that's expected to grow 40 percent globally to a $1 trillion by 2030, and where the U.S. government is stimulating its growth across North America through the CHIPS and Science Act, which committed $52 billion in federal investment and has already attracted $220 billion in announced investments across some 70 projects. The Dominican Republic is a prime candidate to capture increased North American investment in printed circuit board (PCB) manufacturing and offers considerable attractiveness as a destination for near-shored semiconductor assembly, test, and packaging (ATP) activity, in which semiconductors are tested and assembled into sophisticated packages.

Indeed, the Dominican Republic presents one of the most attractive foreign direct investment (FDI) environments the Americas have to offer. The country's political economy is marked by a business friendly environment that features political stability, a liberalized trade regime, and regulatory continuity that affords a stable and predictable operating environment for multinational corporations. These factors have contributed to the Dominican Republic becoming the seventh-largest Latin American economy and growing at a nearly 5 percent (4.9 percent) growth rate from 1972 to 2022, making it one of the world's fastest-growing economies over the past half century. As the International Finance Corporation (IFC) has written, the Dominican Republic's, "remarkable performance can be attributed to several factors, including implementation of sound policies, particularly by the central bank, improvements in policy framework, a more diversified export base, and the economy's structural flexibility to changing global condition." The IFC predicts the Dominican Republic's over 5 percent annual growth rate will persist into the foreseeable future, with the country graduating from middle-income to advanced economy status potentially as soon as 2060.

The Dominican Republic presents one of the most attractive FDI environments the Americas have to offer.

A key driver of the Dominican Republic's economic growth has been FDI in the country's 87 free zones (FZs) that underpin advanced manufactured goods production—notably of electronics products and medical devices/instruments—for export to regional (though principally North American) markets. In the decade from 2013 to 2022, the Dominican Republic attracted a total of $27.7 billion in inbound FDI, with annual investment levels more than doubling from $1.9 billion in 2013 to $4.01 billion in 2022. Just under 20 percent of the inbound investment goes toward industry/manufacturing (tourism and energy being the Dominican Republic's other leading FDI sectors).

The Dominican Republic's FZs are situated across 28 of the country's 32 provinces, supporting 820 companies in operations that employ over 197,600 direct jobs, produce over $8.1 billion in exports annually, and have made cumulative investments of over $7.16 billion in the country. The flourishing of the Dominican Republic's FZs has been made possible by Law 8-90, which exempts beneficiaries from paying 100 percent of income taxes; export or-reexport taxes; import taxes and customs duties on machinery, raw materials, equipment, and construction materials; taxes on the transfer of industrialized goods and services; taxes on patents, estates, or assets; and municipal taxes. Thus, the FZs present a very attractive environment for near-shored manufacturing, particularly of goods intended for export to North American markets.

Medical devices/instruments constitute the country's leading export sector, accounting for $2.25 billon in annual exports, with 5 of the world's top 10 medical device manufacturers operating in the Dominican Republic, and the sector enjoying an annual growth rate of 17.7 percent in 2022. But just behind medical devices comes electronics, the second-largest exporter from the country's FZs and which accounted for $1.2 billion of exports in 2022, with this representing 15 percent of total FZ exports and a 3.8 percent growth rate from the prior year.

Twenty-five leading electronics companies are active in the Dominican Republic's FZs, led by enterprises such as Eaton, Rockwell Automation, Jabil, Fenix Manufacturing Solutions, and Cutler Hammer Industries; 16 of these 25 electronics companies are headquartered in North America, with 22 of the 25 the subsidiary of a foreign parent. Collectively, electronics companies operating in Dominican Republic FZs generate 11,120 jobs, 6 percent of all employment in Dominican Republic FZs. Dominican Republic electronics exports from FZs flow overwhelmingly to North America, with 98.8 percent going to the United States. By product exports to the United States, circuit breakers lead with 62.5 percent of such exports, followed by cellular phones and wireless network equipment at 9.1 percent, and other devices, such as junction boxes, with a 5.3 percent share.

The Dominican Republic offers a cost-competitive manufacturing environment.

Two of the most notable electronics manufacturers in the Dominican Republic are Eaton Corporation and Rockwell Automation. Eaton operates three manufacturing plants in the PIISA FZ in Haina, which together cover 460,000 square feet and employ over 5,000 individuals manufacturing a variety of electrical products, though most notably molded-case circuit breakers, electronics/commercial smart breakers, and miniature and residential circuit breakers. Eaton's Dominican Republic team also won a global competition to site a Santo Domingo R&D and Design Center that will attract some $3 billion in research and development (R&D) investment through 2030. For its part, Rockwell Automation, a global developer of industrial automation and digital transformation technologies, employs over 300 individuals who produce 12 million electronic units (again, largely circuit breakers, PCB assemblies, cabling, etc.) and $53 million in total cost of goods sold annually.

The Dominican Republic offers a cost-competitive manufacturing environment. In fact, the World Bank found that the hourly manufacturing labor cost in the Dominican Republic is $2.50, 6 percent the rate in the United States, approximately half that of Costa Rica or Mexico, and even less than in China.

But another key reason why the Dominican Republic attracts multinationals is that its liberalized trade regime permits exporters duty-free access to more than 900 million consumers across 49 countries. Most importantly, the Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR) liberalizes trade in goods and services between the United States and six Central American countries: Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. The country entered into an Economic Association Agreement with the European Union (EU) in 2008, since when its trade with the EU has increased 231 percent. As the EU has written, "The Dominican Republic has stood out for its punctual implementation of the assumed commitments in the EPA, including the tariff reduction schedule." Critically for electronics manufacturers, the Dominican Republic is also a member of he seminal World Trade Organization (WTO) Information Technology Agreement (ITA), through which 82 nations have collaborated to eliminate tariffs on trade in hundreds of information and communications technology (ICT) products. Lastly, the Dominican Republic collaborates with its partners in Costa Rica, Ecuador, and Panama as part of the Alliance for Development in Democracy (ADD), an initiative to promote democratic strengthening and economic growth through the tightening of the three countries' commercial, demographic, and cultural ties.

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Exporters are also attracted to the Dominican Republic's enviable geographical position in the Caribbean and its world-class logistical infrastructure. The country has the third-best maritime connectivity in the region and the seventh-largest multimodal maritime port in Latin America, meaning products can reach the U.S. East Coast in three to four days. The Dominican Republic ranks second in Latin America regarding international connectivity by air transport, with flights servicing U.S. semiconductor-producing locations across the Northeast, Midwest, and South. The country also enjoys the strongest Internet connectivity in the Caribbean, in part due to being home to NAP del Caribe, one of the most significant network access points (NAPs) in Latin America and one of the 220 NAPs located in 26 countries globally. It is one of only three carrier-neutral NAPs in all Latin America. While the country has traditionally been dependent on imported fossil fuels for energy, clean energy generation now accounts for 18.1 percent of the country's energy supply, with renewable energy expected to account for 25 percent of the country's energy production by 2025. Moreover, in interviews, manufacturers operating in FZs emphasized they receive power from dual sources and indicated that power outages were uncommon.

Countries have moved from being "price makers" to "price takers" in the quest to attract globally mobile advanced-technology industry investment. In fact, leading semiconductor manufacturers may consider as many as 500 discrete factors—ranging from countries' and states' talent, tax, trade, and technology policies to labor rates and laws and customs policies—as they evaluate where to situate multi-billion-dollar fab, or ATP, investments. In other words, the ease and certainty of doing business in a country matters greatly.

Here, the Dominican Republic has worked to make strides, particularly through its "Burocracia Cero" ("Bureaucracy Zero") Program, established through Decree No. 640-20, which seeks to enhance public administration efficiency through clear and appropriate regulatory frameworks. To

date, 315 procedures from 63 government institutions have been streamlined or reformed. For instance, Law No. 167-21 seeks to promote innovation through the application of regulatory policy tools that help inform the policymaking process with evidence-based analysis, with a goal of raising the quality of policies and legislation. From 2019 to 2002, the Dominican Republic's score on the World Bank's "Government Effectiveness" indicator increased from the 38.1 to 50 percent.

The Dominican Republic has also worked assiduously to improve the quality of its customs environment. A flagship initiative has been the 24-Hour Clearance Program, also called Dispatch 24h (or D24H), which seeks to clear containers within 24 hours. To date, the program has cleared over 50,000 containers in 24 hours or less, benefitting more than 6,700 importers. Another critical program for exporters from the Dominican Republic is Exporta Más (or Export +), through which participating companies can export without a physical inspection process and in A fully digital format, eliminating the need for paper documents, thus decreasing the time and costs associated with exporting. Over 250 companies are enrolled in the Exporta Más program, with participating companies making over 177,000 export declarations and the program now covering 58 percent of total exports from the country.

Despite these strengths, if the Dominican Republic is to migrate up the value chain in advanced electronics manufacturing, it will have to be able to educate and field a skilled workforce with the requisite skills to compete in advanced electronics manufacturing. Here, a crucial player will be the National Institute of Professional Technical Training, or "INFOTEP," whose charter is to organize and govern the Dominican Republic's national system of professional and technical training. INFOTEP has 245 operational centers nationwide, through which it offers a total of 920 technical courses, including 86 in electricity and electronics; 36 in ICT; and 104 in the manufacturing, installation, and maintenance of machinery and equipment. Companies fund INFOTEP by contributing 1 percent of their monthly payrolls to the program. INFOTEP is active across virtually all the country's FZs, and manufacturers reported working extensively with INFOTEP to develop customized technical education courses, such as in microelectronics, precision welding, and use of robotics and other "Industry 4.0" automation technologies. Since its inception, INFOTEP has trained 770,914 workers in different competencies and fields via over 40,000 courses and close to 800,000 training hours.

Other important players in the Dominican Republic's technical education ecosystem include the Technological Institute of the Americas (ITLA), a technical institution of higher education founded in 2000. ITLA specializes in training Dominican youth in fields such as software development, information networks, multimedia, mechatronics, automated manufacturing, and computer security. The Technological Institute of Santo Domingo (INTEC) is considered the leading technical institute in the country, and it offers extensive courses in fields such as electrical and mechanical engineering. In short, the Dominican Republic possesses a robust technical education training infrastructure.

In summary, the Dominican Republic has demonstrated the ability to support a high-tech electronics manufacturing industry and possesses the requisite ecosystem assets—digital and physical infrastructure, technical education institutions to support a microelectronics-skilled workforce, regulatory environment, etc.—needed to support its aspirations to compete in semiconductor ATP and PCB manufacturing. The Dominican Republic should be considered a

prime candidate for nearshored, greenfield investment in these sectors. The country should also be considered a leading candidate to be designated a recipient of funding from the U.S. Department of State's International Technology Security and Innovation (ITSI) Fund, which seeks to enhance and ensure semiconductor supply chain security and diversification and promote the development and adoption of secure, trustworthy telecommunications networks.

The report makes the following policy recommendations:

- The Dominican Republic should be considered a leading candidate to be designated a recipient of funding from the U.S. Department of State's ITSI Fund.
- The government of the Dominican Republic should develop an explicit national semiconductor value proposition and broader competitiveness strategy.
- The Dominican Republic should launch an awareness campaign reaching out to global investors in advanced electronics industries highlighting the country's favorable FZs and tax policies.
- The Dominican Republic can help address this gap by expanding the availability of degree programs in electrical engineering, computer science, and related courses.
- The Dominican Republic needs to increase the number of individuals holding IPC 610 certifications.
- The Dominican Republic should consider expanded use of investment incentives to attract semiconductor industry manufacturing activity.
- The Dominican Republic should set up a "one-stop-shop" to facilitate the regulatory clearance of all permits and approvals, such as environmental review permits, that would be required to launch a semiconductor ATP or PCB facility in the country.
- The Dominican Republic should join the expanded ITA (ITA-2) and join discussions toward promulgating an ITA-3.
- The Dominican Republic should champion robust digital trade regulations, and one way it could do so would be by joining the WTO's Joint Initiative on E-commerce.
- The Dominican Republic should explore the possibility of entering into such a protocol with the United States, with the intent of further strengthening the trade and investment environment between the two nations.

Read the Full Report

Stephen Ezell, "Assessing the Dominican Republic's Readiness to Play a Greater Role in Global Semiconductor and PCB Value Chains" (ITIF, January 2024), https://itif.org/publications/2024/01/29/dr-semiconductor-readiness/.

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