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The Panama Tech Highway

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Microchips and semiconductors are the fundamental building blocks of the digital age, playing a crucial role in a wide range of electronic devices, from smartphones and computers to automobiles and household appliances. These small but powerful devices, made from semiconductor materials such as silicon, enable the miniaturization and efficient performance of modern technology. The evolution of microchips has driven significant advances in computing, communications and automation, transforming virtually every aspect of our daily lives and enabling innovations in sectors such as medicine, industry and entertainment.

Panama is in many ways, a point of interconnection for the business world due to advantages such as our geographical position, our free trade zones and of course the Panama Canal. Given the reality of the digital era, it is imperative to create the right environment to cope with the speed with which technological development is advancing. Technology is making its way more and more into the daily life of human beings and the future is where we must point our development efforts as a country.

In terms of microchips, the growth in recent years has been exponential. Technological research discoveries allow us to land on a definition for this technology. A microchip is an integrated circuit or a structure of small dimensions formed by a semiconductor material. The term semiconductor refers to the material itself, such as silicon or germanium. They are currently used in virtually all electronic equipment such as computers, cell phones, cars, among others. Despite being a simple definition at first glance, the value chain of this technology is complex. The companies that dominate the sector have identified how to manage it optimally from the acquisition of raw materials, through product development and culminating with the distribution of the product. But what is really needed to execute this dynamic? What is the current situation in Central America in the field of this technology? What is required to create a viable ecosystem for Panama to become one of the leaders in this industry?

In principle, it is necessary to understand the stages of development of this technology, which has become the basis for driving products in multiple industries such as computers and electronic devices, telecommunications and cell phones, home appliances, automotive industry, medical devices, and everything related to the Internet of Things (IoT); microchips are currently the backbone of the technology. Their creation involves several stages, such as:

- Preliminary research and project development: Engineers and scientists design the microchip using specialized software to create detailed schematics of the integrated circuit. Research is done on the semiconductor materials to be used in the fabrication of the chip.

- Semiconductor manufacturing: Semiconductor material, such as silicon, is purified and formed into thin, flat wafers that serve as the basis for microchips. Circuit patterns are printed on the wafers using photolithography techniques. A process is carried out to modify the electrical properties and insulating materials are deposited and etched onto the wafers to form the circuits.

- A testing stage: Each wafer is electrically tested for functionality, then individual chips are cut and assembled into protective packages and again each assembled chip is tested for functionality.

- Packaging and distribution: Precautionary measures are taken to package the product and ensure its preservation during storage and transportation, and it is distributed to electronic device manufacturers.

- Electronics assembly and final product testing: Microchips are integrated into the production of various electronics and then tested again to verify their functionality.

It is a complex process that involves multiple actors with different competencies, and our goal is to identify our strengths as a country in order to land at which stage of the value chain we could actively figure successfully.

Central American efforts in the semiconductor industry

As a result of the Covid-19 pandemic and the various tensions between the major powers, a microchip shortage crisis has arisen that has transcended to affect all industries in which these devices are used. With the purpose of seeking solutions, the United States signed in 2022 the so-called CHIPS AND SCIENCE ACT, which promises to allocate funds for the development of the U.S. microchip industry and establishes tax incentives for the same conclusion, allying with strategic countries that, due to their geographical position, can facilitate their incorporation in the semiconductor value chain. One of the countries that is already actively participating is Costa

Rica. Its technological ecosystem has brought as a consequence the presence of high caliber companies such as Microsoft, Hewlett Packard, Google, Amazon and Intel, the latter of relevant importance, since it has located in the Central American country a microchip assembly and test plant that has operated efficiently. Once the silicon wafers are ready, they are cut into individual chips and proceed with their classification, then they are taken to an assembly and testing plant, where each chip is packaged with the required protection that allows it to be connected to other components, to finally test its functionality. This investment made by the Californian company in Costa Rica, optimizes its microchip supply chain while generating for the country a considerable impact on the economy, and growth and training opportunities for its population, which has been training in technology-related skills, with the aim of creating the scientific and competent ecosystem required to carry out these operations successfully.

Intel announced in August 2023 that it planned to invest $1.2 million in Costa Rica for the expansion of the semiconductor sector, the funds are being used to upgrade and continue in the process of transforming the operations they already have in conjunction with making an economic injection to the education sector to continue training personnel in the technical semiconductor industry. They also aim to create more jobs in the STEM areas: science, technology, engineering and mathematics. In addition to the assembly and test plant, they also have a research and development center and a global services center. This company's commitment to the Central American region has positioned Costa Rica as an important technological hub in Latin America, with a qualified labor force and an ecosystem in growing development.

Recognizing the initiative and drive that Costa Rica has had in this industry and what it has meant in terms of economic development for the country, we must identify how Panama could also become a strategic ally for the United States. We have a privileged geographical position that serves as a bridge between North and South America, facilitating the transit of goods; we have the Panama Canal, advanced seaports, international airports and a constantly improving road network; we have developed a robust service economy with a focus on logistics and international trade; and, above all, there is interest in enhancing and growing the current technological infrastructure. Faced with these statements, what is stopping us from becoming the next technology hub in Central America?

The international technology landscape

By taking a tour of how the technology industry performs around the world, we will have a better perspective of Panama's needs to succeed in the development of new technologies, identifying our strengths after analyzing what has been successful in other jurisdictions.

URUGUAY

Uruguay has shown a strong commitment to technological innovation through agencies such as the *National Agency for Research and Innovation (ANII)*, which promotes projects in various technological areas. At present, the specific area of semiconductors and microchips is not thoroughly regulated, but Uruguay stands out in the general technological landscape because of its infrastructure and willingness to grow and develop. ANII could support research and development involving microelectronics. Uruguay's policies are geared toward attracting investment in technology and services, although there is no specific focus on microchip or semiconductor production. However, the country has developed technological infrastructure that could be leveraged for future investments in this sector. Uruguay has free trade zones that offer tax incentives for technology companies. Although semiconductor manufacturing is not common, free trade zones could be attractive for the installation of microelectronics research and development centers. The main free trade zones that we consider of particular relevance for the technology sector are:

1. *Zonamerica*, in Montevideo: It specializes in technology services, logistics, trade and global services. It offers a total exoneration of national taxes, including Income Tax on Economic Activities, Wealth Tax and other taxes.

2. *World Trade Center Montevideo Free Zone*: It is a business center that specializes in financial services, technology and global services. It is a favorable environment for the development of *software* companies, *fintech*, and other technological services. It allows them to access a total exemption from national taxes, and has a modern and advanced infrastructure.

3. *Zonamerica*, in Colonia del Sacramento: It has the same tax exemptions as Zonamerica Montevideo, with the additional advantage of being close to the border with Argentina, which facilitates logistics and international operations.

4. *Colonia Suiza Free Trade Zone*: This is an opportunity for technology companies to operate in a modern infrastructure. The fiscal incentives offered are similar to those of other free trade zones, with the added value of facilitating access to regional markets. It is focused on companies dedicated to technology services and especially to areas of production and assembly of electronic components.

With the increase in global demand for semiconductors and microchips, Uruguay could explore opportunities to attract foreign investment in this sector, especially in areas of research, development of emerging technologies, and production of electronic components. They may not be involved to the maximum of their capabilities in the microchip industry, but they have certainly built a technological ecosystem that can serve as a base to develop microelectronics and its logistics on a large scale in the near future.

GERMANY

Moving to the European continent, Germany is an active player in the semiconductor and microchip industry, with legislative efforts creating a robust regulatory framework of opportunities for microelectronics development. Projects of particular relevance are:

1. The National Semiconductor Strategy: Involves plans to support local production and come down to dependence on foreign suppliers, especially in critical sectors such as automotive, telecommunications and industrial technology.

2. The *Important Projects of Common European Interest (IPCEI)* in microelectronics: This is a funding program to support research, development and production of semiconductors in Germany, in order to position itself as a relevant player on the global scene.

3. Tax Incentives: Germany offers a variety of tax incentives for companies that invest in research and development in the semiconductor sector. These include tax deductions for innovation expenditures, and tax credits for specific technology development projects.

4. Financing Innovation: In addition to tax incentives, direct subsidies for research and development projects are available through institutions such as the *Federal Ministry of Education and Research* (BMBF) and the *Federal Ministry of Economics and Energy* (BMWi).

It is an effort of different institutions with the common conclusion of fostering innovation in microelectronics.

As part of the European Union, Germany responds to region-wide initiatives such as the *European Semiconductor Regions Alliance*, which aims to coordinate efforts among participating nations to strengthen the semiconductor industry, and also commits to the implementation of the *EU Chip Law*, another regulatory effort for the European technology sector.

The *EU Chip Law* proposes an investment of more than 43 billion euros over an extended period until 2030. The initiative is in support of:

- Investments in next-generation technologies.
- Provide Europe with the necessary tools to carry out the entire chip value chain, including chip assembly and testing.
- Position the countries as attractive options for investors seeking to set up operations in Europe.
- Support emerging companies in accessing financing for their technology projects.
- The creation of international semiconductor partnerships with like-minded countries.

Germany's efforts, and those of Europe in general, are positioning them as an ecosystem conducive to the early stages of the microchip value chain, with expectations of growth in the coming years, entering the race to lead the technology sector.

SINGAPORE

In Asia, one player that has demonstrated authority in the field over the last decade is Singapore. Its national semiconductor strategy has different initiatives and entities, all with the common purpose of positioning itself as a leader in all spheres of the technology industry. Its efforts involve:

1. A government agency called the *Economic Development Board* is responsible for positioning the country as a global business center. For the semiconductor industry, it is a crucial player because it promotes the attraction of foreign investment and fosters the development of the country's capabilities in semiconductor production. It also offers financial and infrastructure incentives to attract global companies to establish manufacturing plants and research centers in the country.

2. The government encourages the digitization and modernization of manufacturing plants through subsidies and training programs, all with the aim of moving in the direction of Industry 4.0 and the possibilities of process optimization in microchip manufacturing and logistics, with technologies such as artificial intelligence, automation and *big data*. The *Economic Development Board* grants the *Pioneer Certificate Incentive* and the *Development and Expansion Incentive*, which provide tax exemptions for companies that contribute substantially to Singapore's economic development.

3. The *Singapore Semiconductor Industry Association*, a non-profit organization that seeks to advocate for the development of the semiconductor industry by facilitating the possibility that all stages of the microchip value chain can be carried out in Singapore, is active in the technology ecosystem.

4. Government funding initiatives through institutions such as *Enterprise Singapore* and the *National Research Foundation*, both of which aim to fund programs that seek to innovate in areas such as advanced manufacturing and chip miniaturization.

These proposals are complemented by legal regulations regarding the environmental impact of industrial emissions in semiconductor production, the promotion of energy efficiency in the construction of manufacturing plants, a robust legal framework for intellectual property and data protection, semiconductor export regulations and free trade agreements with numerous countries. This legal strength together with the infrastructure and innovation ecosystem they have developed for microchip manufacturing ultimately places them at the forefront of technological development in this industry.

JAPAN

Report Asia, a digital media outlet published in October 2023 an article that uniquely portrays the semiconductor landscape in Japan mentioning:

1. *The Semiconductor and Digital Industry Strategy*, formulated in 2021 where the government has targeted to increase total semiconductor-related sales of companies manufacturing semiconductors in Japan to 15 trillion yen by 2030.

2. The creation of *Rapidus*, a company whose purpose is the research, development, design, manufacture and sale of electronic components such as semiconductor devices and integrated circuits, as well as the development of human resources that will lead the semiconductor industry.

3. *Rapidus*' settlement drive in Chitose City, Hokkaido. Its CEO envisions for the future that the location will become a hub for international collaboration, domestic and foreign investment in cutting-edge technology, making it the "*Hokkaido Valley*".

4. The business plans of *Taiwan Semiconductor Manufacturing Company (TSMC)*, the leading global producer of advanced chips, which is opening from February 2024 its first fab in Kumamoto, southern Japan, backed by government grants of 476 billion yen, and is already planning to build a second plant in the same location by 2027. The plant will be operated by a joint venture entity called *Japan Advanced Semiconductor Manufacturing (JASM)* and majority-owned by *TSMC* (86.5%) and minority-owned by giants *Sony* (6%) and *Toyota* (2%) and Japanese automotive components maker *Denso* (5.5%).

5. U.S.-based *Micron Technology* will invest up to 500 billion yen in Japan over the next few years, including the expansion of its plant in Hiroshima, while semiconductor equipment maker *Applied Materials* recently announced plans to hire more than 800 new engineers for its Japanese operations.

These timely advances in the revitalization of Japan's semiconductor industry are supported by regulations enacted by *METI, the Ministry of Economy, Trade and Industry*, whose policies include subsidies for research and development, tax incentives, and support for the construction of state-of-the-art semiconductor factories. In addition, Japan also has environmental and energy efficiency regulations aimed at regulating emission control and hazardous waste management. The *Chemical Substances Control Act* and the *Sustainable Resources Management Act* are some of the legal frameworks governing production in this sector. Like Singapore, it also has robust legal regulations on intellectual property and export regulation.

They complement these legal provisions with initiatives such as grants and funding for technology projects for both large companies and SMEs; they pay special attention to the training of professionals in the areas of science, technology, engineering and mathematics (STEM), through university and technical programs, with the *Tokyo Institute of Technology* and *Kyoto University*

standing out; they also actively participate in the global ecosystem by collaborating closely with other countries in the development and production of semiconductors, sharing knowledge and technology, and remaining active in international forums and organizations relevant to the industry.

Japan continues to be a global leader in this industry, with a focus on innovation, quality and sustainability. And together with the other jurisdictions we have evaluated, we can conclude that positioning ourselves within the semiconductor and microchip industry is a challenge that requires a comprehensive effort of multiple actors, initiatives, institutions and legislations working together to achieve that goal. For Panama, the possibility of being part of the semiconductor value chain lies in our strength, our logistical infrastructure, but even so, this stage of the chain is also accompanied by its challenges.

What leaders in the logistics industry are saying

Before going into detail about the proposal for a logistics hub in Panama, it is important to understand the sensitivity of the materials related to the semiconductor industry and how their logistics play an essential role in the chain of factors that culminate in the distribution of the final products. The logistics of high-tech products take a technical twist when it comes to their execution, as these products require special care to be considered when working on structuring a supply chain for them. Some particularities to take into account when handling raw materials and other elements related to semiconductors are:

1. Sensitivity to shock, temperature and vibration: Proper material handling competency comes into play here, involving protective packaging, cushioning materials and product handling standards. Improper handling resulting in deterioration of the raw material can lead to a malfunction in the final product. This is why it becomes imperative to take appropriate protective measures.
2. Storage standards: The value of these products is high not only in the economic sense but also for the data they contain. The places determined for their storage must be equipped with security technology that guarantees the protection of the materials.
3. Product traceability: In the same sense that it is essential to ensure proper storage, it is equally vital to be able to keep track of their transport throughout the supply chain. Traceability makes it possible to quickly identify and isolate defective batches and helps to identify recurring problems, enabling active measures to be taken. Of course it also allows for better inventory planning and management, coming down to costs and

improving operational efficiency. As a complementary function, traceability of technology elements can provide valuable data on the performance of components at different stages of the product life cycle, informing the development of new products and technologies.

4. Returns management: It is vitally important due to the high precision and quality demanded in end products that rely on these components, such as electronic devices, automobiles and medical equipment. Efficient returns management allows for quick identification of failures and problems in the supply chain, ensuring that only the highest quality semiconductors reach the market. This not only protects manufacturers' reputations and increases customer satisfaction, but also comes down to reducing costs associated with defective products and optimizing production processes. In addition, effective returns management provides valuable data that can be analyzed to continuously improve products and processes, driving innovation and maintaining competitiveness in a highly technological and dynamic marketplace.

Regarding the challenges of logistics in the semiconductor industry, major companies have expressed their views on the challenges posed by high-tech transportation, i.e. technology that is in its most advanced state. **Maersk**, a global company in the logistics and shipping sector, manifested in the publication "Advances and Challenges for Logistics in the Technology Segment" of Logistec magazine[1] , that the main challenges are:

1. Fragmented infrastructure: When the supply chain design is very fragmented, i.e. it involves several transportation, warehousing or software providers, it becomes complicated to rationalize which ones are of real use, which is necessary for standardization, having the same *kpi*'s, the same billing models, contracts under a single agreement.
2. Long distances: Depending on how the chain is designed, it is necessary to evaluate whether the design suits the company or the logistics operator.
3. Strict regulations: In many Latin American countries, there are regulations to comply with, such as transport weight restrictions, *cross boarder* services, etc. This allows, in some circumstances, the logistics model to be based on the fiscal model.
4. Risk management: Specifically, technology companies must face multiple challenges due to the logistical expenses they must make in security, not only in the carrier, type of

[1] Logistec Magazine, August 2023. Retrieved from ADVANCES AND CHALLENGES FOR THE LOGISTICS OF THE TECHNOLOGY SEGMENT (revistalogistec.com)

insurance, etc., but also in insuring the workers inside their suppliers' warehouses. High-tech" warehouses are a segment that requires a greater effort.

5. Obsolescence: Introduce new products and optimize merchandise rotations to maintain a leaner inventory by understanding what data needs to be made available to you.
6. Increased time to market: Accelerate product distribution with customized supply chain contributions to B2B, B2R, and B2C.
7. The premium perception: Learn how premium services, warranty programs or scheduled technician visits can make a visible difference in day-to-day operations.
8. Ad hoc, oversized/overweight deliveries: For technology and white goods, equipment must be provided to deliver each product in the best conditions. Sometimes the final customer stops the purchase due to the trauma caused by an inefficient delivery.
9. Ineffective repair service tactics/long cycle time: It is important to provide a first-class maintenance service with expertise and infrastructure that meets the requirements of the four levels of technical support.

DHL, another leading transportation and logistics company, published "Four Strategies to Prepare for the Future of Semiconductor Supply Chains" [2] . The article begins by referring to the semiconductor shortage crisis that arose as a result of the Covid-19 pandemic, mentioning some relevant statistical numbers. Rooted in the shortage that emerged in the second half of 2020, it is estimated that there were lost profits reaching $500 billion worldwide by the end of 2021. Demand for semiconductor components remains high with an estimated 1.9 billion units sold in 2022, and the need for this technology is projected to continue to rise, with revenue estimates from $600 billion today to $1 trillion projected by 2030.

They state that chip producers have addressed the shortage with an investment of approximately $99 billion in new fabs, and that while this action responds to the production problem, it results in the emergence of new challenges in the logistics sector, which is another essential component of the entire semiconductor value chain.

They say that logistics companies play a crucial role here that goes beyond traditional transportation services, as they are involved in project management, operational support, warehouse management, stakeholder coordination and much more. The logistical complexity of

[2] DHL, March 2023. Retrieved from Future-proofing semiconductor supply chains - Delivered - Global (dhl.com)

all this has grown even more as the industry executes multiple fab construction projects at the same time.

To contribute to the successful development of the semiconductor supply chain, and to be prepared for any upcoming shortage eventuality, they propose four strategies that are relevant.

1. Accelerate digitization: If it was once a convenience to have a technological tracking system, it is now imperative. It is necessary to maintain a digital system to keep track of shipments, cargo and inventories, on a platform that is accessible to all participants in the supply chain, in order to optimize transportation dynamics.

2. Building strong alliances: With the primary conclusion of increasing the efficiency of the entire chain. Good strategic alliances help to overcome the effects of capacity constraints and the availability of capital goods.

3. Develop a resilient product and inventory strategy: Logistics service providers can intervene by improving their warehousing capabilities with new locations, and developing inventory analytics plans, all to build more flexible supply networks.

4. Reduce environmental impact: Today's consumers in all industries are demanding greener initiatives, and the logistics sector can contribute by providing emissions data, optimizing loads and routes, and investing in greener fleets.

In conclusion to this publication, optimizing the semiconductor industry requires a multifaceted strategy that addresses several key aspects of the business. Accelerating digitization not only improves operational efficiency, but also enables better data and process management. Building strong partnerships, both locally and globally, facilitates access to new markets and technologies, fostering collaborative innovation. Developing a robust product and inventory strategy ensures rapid response to market fluctuations and customer demands, while reducing environmental impact not only meets growing regulations and societal expectations, but also positions companies as responsible leaders in sustainability. Together, these strategies provide a comprehensive roadmap to strengthen the semiconductor industry's competitiveness and resilience in an increasingly dynamic and demanding environment.

Panama begins to figure in the technological landscape

In this year 2024, there have been important legislative efforts to create an enabling environment for the development of new technologies, among those concerning this sector in particular, **Decree No. 7 of April 30, 2024** was enacted**: Establishing guidelines for the development and promotion of the microelectronics and semiconductor activity**. The previous considerations of the Decree recognize that it is necessary:

- Generate a national strategy and action plan that will allow us to take on the challenge in an organized, coordinated and systemic manner with a long-term vision.

- Promote and encourage research and development related to semiconductor manufacturing.

- Create a Microelectronics and Semiconductor Innovation Commission as a space for inter-institutional and multi-sector interaction to follow up on the actions of the national semiconductor strategy.

- Promote specialized education and training of human talent in the semiconductor area.

- Encourage semiconductor companies interested in locating in Panama to allocate part of their profits to significant investments for workers and the community, including opportunities for small businesses, research centers, and support for disadvantaged communities.

- Invest in STEM education and training starting in basic education to strengthen human talent with a long-term vision.

- Generate a national training network in microelectronics and semiconductors, which will provide trained human talent in accordance with the requirements of global chains.

- Establish a one-stop shop at the Ministry of Commerce to simplify the microelectronics investment process, allowing interested companies to resolve all their doubts and initiate operations through a single point of contact.

In order to achieve these objectives, the **National Strategy for the Development of Semiconductors and Microelectronics for Panama** was established at, which should serve as an instrument to materialize these technology development efforts, and will be accompanied by an Action Plan for its implementation, with the purpose of making Panama not only a reference in the technology sector, but also to provide the basis to facilitate and expedite the investment process for companies in the microelectronics sector interested in establishing or expanding their operations in the Republic of Panama.

The Microelectronics and Semiconductor Innovation Commission is created as the inter-institutional and inter-sectorial promotion and coordination body for the execution of the strategy and strategic action plan, which will be integrated by different members of the administrative sector and representatives of the education and research sectors. In addition, the Microelectronics and Semiconductors Technical Advisory Council is created as the technical-scientific body in charge of advising the National Commission for Innovation in Microelectronics and Semiconductors in the areas of human talent training, scientific research, technological development, international cooperation, production and distribution. The latter will be made up of seven national or foreign scientists or specialists of recognized trajectory in the industry or academia related to microelectronics and semiconductors. The position of National Commissioner of the Microelectronics and Semiconductor Industry of Panama is also created, attached to SENACYT and appointed by the President of the Republic from a list of three candidates proposed by the Microelectronics and Semiconductor Innovation Commission, with the purpose of leading the design and ensuring the execution of the strategy and action plan for this industry, in addition to representing the National Government before any national or foreign instance, regarding Microelectronics and Semiconductor activities.

Having established an institutional framework to carry out the sector's initiatives, the Decree proposes that, within 180 days after the issuance of the executive decree, the Microelectronics and Semiconductor Innovation Commission, together with the Presidency of the Republic, will draft a bill to be submitted to the National Assembly containing at least:

- A tax incentive that allows companies linked to the semiconductor and microelectronics chain to credit 30% of the total amount invested in research and development in the previous fiscal year against income tax.

- A tax incentive in which companies can deduct from income tax the economic contributions they make to provide specialized training to human talent of Panamanian nationality and the donations they make in favor of activities related to STEM training and innovation.

- Programs to promote productive linkages with Panamanian technology entrepreneurs in conclusion of which they will become suppliers of the global microelectronics and semiconductor chain.

- A framework of immigration incentives to attract specialized human talent to Panama, including specialized work permits for highly qualified professionals in semiconductor and microelectronics-related areas, as well as residency programs for investors and entrepreneurs who wish to establish semiconductor-related companies in Panama.

- Simplification of procedures for the hiring of highly qualified foreign personnel in semiconductor companies established in the country.

- The creation of a National Fund for the Semiconductor and Microelectronics Industry of Panama, administered by SENACYT and supervised by the Office of the Comptroller General of the Republic, as a mechanism to subsidize the financing of activities aimed at developing, promoting and creating the conditions for the promotion of activities in the semiconductor and microelectronics sector in Panama.

- The origin of the contributions to the National Fund for the Semiconductor and Microelectronics Industry of Panama, opening the possibility of having contributions from the Central Government, annual budget allocations designated by the State and contributions from governmental entities of the Panamanian State.

- The possibility that the National Fund for the Semiconductor and Microelectronics Industry of Panama may receive tax-deductible donations from private entities and international organizations.

- The resources allocated to the National Fund must be used only for those actions defined in the Strategic Action Plan, which may include programs, projects, studies, specific research, scholarships, incentives to researchers, incentives to entities, entrepreneurs and

companies, support for training programs, investment in infrastructure, technological developments, support for entrepreneurship and innovation projects and any other economic support, incentive or aid that promotes the development of the semiconductor and microelectronics industry in Panama.

- The destination of the resources of the National Fund to be distributed in 25% to the promotion of technological entrepreneurship linked to the semiconductor and microelectronics value chain, 25% to promote scientific research and technological development in the semiconductor and microelectronics sector, 25% to promote the training of human talent in the semiconductor and microelectronics sector, and the remaining 25% for activities defined by the fund manager.

- Any other relevant tax and migration incentives that align with the National Semiconductor and Microelectronics Strategy.

As a scientific and technical ally of the strategy, the Center for Advanced Semiconductor Technologies was created at the facilities of the Technological University of Panama.

Vision of the Future: *The Panama Tech Highway*

The legislative initiative previously analyzed proposes a significant advance for Panama's technological infrastructure, but it will be both an exciting and complex challenge to materialize it. If successfully carried out, it could generate thousands of jobs in the technology sector, an increase in foreign investment strengthening the national economy, and of course, the inevitable promotion of innovation and technological development in the country.

In principle, it must be recognized that academic and professional training in the areas involved with technology, although it is in development, it is a long-term goal to have trained personnel to assume responsibility for the first stages of the semiconductor value chain. However, when it comes to raw materials, proximity to markets and cargo handling, there is an opportunity with fruitful potential for a country with a logistics infrastructure like ours, and we must take advantage of it. Let us exploit our strengths, our experience and competence in strategy and transportation, and let us materialize ***The Panama Tech Highway*** in Panama.

In order to propose a legislative initiative such as ***The Panama Tech Highway*** it is necessary to understand the context involved in this proposal, it is necessary to go into detail regarding:

- **Panama's current situation.**
- **The legislation currently potentially affecting this sector, highlighting the relevant aspects of each one, its potential impact and benefits, as well as its limitations and shortcomings.**
- **The current tariff structure for semiconductor and microchip raw materials.**
- **The international references we have from countries that are developing optimal infrastructures for the development of the semiconductor and microchip industry.**

Only then will we be able to issue an informed opinion on the legislative needs to carry out the project and genuinely have a tangible impact on the country's economy.

Summarizing the current situation in Panama

The relevant aspects for ***The Panama Tech Highway*** proposal can be come down to four elements that are relevant to this topic:

1. **Strategic Location**: Panama is located in a privileged geographical position that serves as a bridge between North and South America, facilitating the transit of goods.
2. **Infrastructure**: Panama has the Panama Canal, advanced seaports, international airports and a constantly improving road network.
3. **Economy and Trade**: The country has developed a robust service economy, with a focus on logistics and international trade. Although Panama is not a high-tech producer, its advanced logistics infrastructure allows it to capitalize on the transit and handling of these products.
4. **Technology and Connectivity**: Although growing, the technology infrastructure needs improvement to handle high volumes of technology products. There is room to incorporate artificial intelligence and automation technologies to optimize logistics and goods handling processes. This could include the use of predictive algorithms for inventory management and automated systems for product handling and distribution.

With these realities in mind, we can strategically analyze the existing legislation and its impact on the technological legislative proposal with which we want to position Panama within the microchip and semiconductor logistics industry.

Current regulations applicable to the technology sector

We will make a detailed analysis of each regulation that in some way has an impact on the country's technological infrastructure, what are its relevant aspects, its benefits, how it would impact ***The Panama Tech Highway***, and what are its shortcomings or weaknesses.

1. **Law 54 of July 22, 1998: For the Legal Stability of Investment in Panama.**

Its main objective is to stimulate and guarantee domestic and foreign investment to promote the growth and economic development of Panama. This law offers legal and tax stability to investors, assuring them that they will not be affected by unfavorable changes in legislation during a given period. Some key aspects of the law:

- It guarantees legal and tax stability for a period of ten years for registered investments. This means that investors will be protected against legislative changes that may affect their rights and benefits acquired at the time of registration.
- Foreign investors have the same rights and obligations as domestic investors, including the free repatriation of capital, dividends and profits.
- It applies to a wide range of economic activities, including tourism, industry, exports, telecommunications, and power generation, among others.
- Investors must present a detailed investment plan and commit to invest a minimum of two million balboas (USD $2,000,000.00) within two years.

Among the potential benefits of this specific legislation that could have an impact on Panama's logistics future:

- Law No. 54 offers investors legal and tax stability, which is attractive to technology companies seeking a predictable environment for their operations.
- Equal rights for foreign investors allow for fair competition and can attract global companies interested in using Panama as a distribution and transit hub.

Obstacles and limitations include:

- Although Law No. 54 covers a wide range of activities, its focus is not specifically aligned with the logistics and handling of high technology such as microchips. The law mentions sectors such as tourism, industries, and telecommunications, but does not explicitly address the transit of high-precision technological components.

- The requirement of a minimum investment of two million balboas may be an obstacle for some technology companies seeking to establish transit operations and not necessarily capital intensive investments.
- Law No. 54 does not provide specific or tailored incentives for the handling of high-tech raw materials. The needs of the microchip industry, such as advanced technological infrastructure and rapid movement of sensitive cargo, may not be fully covered by this law.

Although Law No. 54 of 1998 provides a stable legal and fiscal framework that could benefit ***The Panama Tech Highway*** project, its specific applicability to the logistics and handling of high-tech raw materials such as microchips is limited. The law is designed to attract investment in more traditional sectors and does not adequately address the particular needs of the high-tech industry.

2. **Law No. 41 of August 24, 2007: Establishes the Special Regime for the Establishment and Operation of Headquarters of Multinational Companies (SEM) in Panama.**

Its objective is to attract and promote investment, generate employment and facilitate the transfer of technology, making Panama more competitive in the global economy. Among its key aspects:

- The law seeks to attract investments from multinational companies and is applicable exclusively to SEM operations.
- A multinational company is defined as a company headquartered in another country that carries out productive, commercial, financial or service activities in several countries. A SEM is a multinational company that offers services from Panama to its parent company, subsidiaries, affiliates or associates.
- It includes management and administration, logistics and warehousing of components, technical assistance, financial management, accounting, design and construction, electronic processing, marketing and advertising consulting, operations support, and research and development, among others.
- The requirements to obtain an SEM license include information on assets, operating headquarters, commercial activities, stock exchange listing, among other parameters established by the Multinational Corporations Headquarters Licensing Commission.
- SEMs are exempt from paying Income Tax for services rendered to entities domiciled abroad that do not generate taxable income in Panama. They are also exempt from the Tax on the Transfer of Movable Goods and the Provision of Services for export services.

- Immigration facilities for foreign personnel of SEMs, including permanent and temporary visas with associated work permits.

As for its benefits:

- The law offers a favorable tax regime and administrative facilities to attract multinational companies, which may be attractive to technology companies wishing to establish logistics operations in Panama.
- The law provides a favorable immigration regime for foreign personnel, facilitating the mobility of highly specialized professionals needed in the high-tech sector.

In relation to its limitations:

- Law No. 41 is designed to attract regional headquarters of multinational companies that provide administrative, financial, logistical and other services to their parent companies and subsidiaries. It is not specifically focused on the transit and handling of high-tech raw materials such as microchips.
- SEM licensing requirements include specific parameters such as company assets, business operations and stock exchange listing, which may not be relevant for companies focused exclusively on high-tech logistics.
- Law No. 41 does not provide specific incentives for the handling of sensitive technological components such as microchips. The needs for advanced and fast technological infrastructure and mobilization of sensitive cargo are not fully addressed. Although Law No. 41 of 2007 provides a favorable legal and fiscal framework that could benefit ***The Panama Tech Highway*** project, its specific applicability to the logistics and handling of high-tech raw materials such as microchips is limited. The law is designed to attract investment from multinational companies in service sectors, and does not adequately address the particular needs of the high-tech industry.

3. **Law 59 of August 11, 2008: Law on Universal Service and Access to Information and Telecommunications Technologies.**

It aims to promote and guarantee universal access to these services throughout the territory of Panama, especially for those citizens in areas with geographic and/or economic limitations. Regarding its key aspects:

- Guarantees universal access to information and telecommunications technologies to increase the quality and coverage of these services throughout the country.
- The law is governed by principles of non-discrimination, availability, accessibility, affordability, equity, technological neutrality, quality, efficiency, transparency, and the right to information and communication.
- Specific funds are created to finance projects that ensure the extension and quality of information technology and telecommunications services.
- An Advisory Board is established to supervise the constitution and execution of the funds, composed of various governmental entities.
- The Advisory Board determines the projects to be financed, focusing on areas of social interest and promoting educational services, internet access, and technologies for people with disabilities, among others.

Evaluating its benefits we can conclude:

- The law promotes the expansion of technological and telecommunications services, which is essential for the handling and transit of advanced technological components such as microchips.
- The existence of funds for universal access projects can be a source of financing to improve the technological infrastructure necessary for the project.

Analyzing its limitations and the challenges it represents for the project:

- The law is designed primarily to improve access to technologies in rural and low-income areas, which does not necessarily align with the specific needs of a high-tech transit hub.
- The law does not specifically address the transit and handling of high-tech raw materials, focusing more on the accessibility and availability of basic telecommunications services.
- The projects financed by this law are oriented towards educational services, internet access and technologies for people with disabilities, which is not directly aligned with the objectives of "***The Panama Tech Highway***".

Although Law No. 59 of 2008 provides a framework for improving telecommunications infrastructure and promoting universal access to information technologies, its approach is not aligned with the specific requirements of ***The Panama Tech Highway*** project. The law is designed to improve access to basic telecommunications services in rural areas and for people with

disabilities, and does not address the specific needs of a transit and handling center for high-tech raw materials such as microchips.

4. **Law 41 of July 20, 2004: Which Creates the Special Regime for the Establishment and Operation of the Panama-Pacific Special Economic Area.**

Its objective is to attract investment and promote economic development through tax, customs, labor and immigration incentives, in addition to establishing a legal framework that facilitates the operation of companies in this area. Among its key aspects:

- The law establishes a special regime that includes tax, customs, labor and immigration benefits for companies operating within the Panama-Pacific Area.
- The Panama-Pacific Special Economic Area Agency is created, responsible for the administration and regulation of activities within the area.
- Exemptions from income tax, transfer tax on personal property and services (ITBMS), municipal taxes and other levies.
- Tariff exemption for the import of raw materials, equipment and other goods necessary for operations.
- Special visas for workers and investors operating in the area, facilitating the mobility of foreign personnel.
- Legal stability guarantees for registered companies, ensuring that the conditions under which they are established will not be unfavorably modified for a period of ten years.

Among the benefits that would impact the project:

- The law provides tax exemptions and customs simplifications, which is highly beneficial for the handling and transit of advanced technological components such as microchips.
- The immigration provisions would facilitate the entry and stay of foreign specialized personnel necessary for the technological operations of the project.
- The existence of a dedicated administrative committee can facilitate problem solving and efficient management of operations.

Regarding its limitations:

- Although the law provides a favorable framework for various economic activities, it is not specifically designed for the handling and transit of high-tech raw materials such as microchips.
- Companies must comply with a number of administrative and operational requirements that may not be fully aligned with the specific needs of the high-tech sector. This includes filing various documents and complying with regulations that may be too general for the specialized demands of handling advanced technological components.
- Law No. 41 does not provide specific incentives tailored to the needs of the high-tech sector. Although it offers general tax and customs benefits, it does not address the particularities of the transit and handling of sensitive technological raw materials such as microchips, which require highly specialized infrastructures and processes.
- The law does not guarantee the availability of state-of-the-art technological infrastructures and services necessary for the efficient and secure handling of microchips and other high-tech components. This includes lack of adequate storage facilities, specialized handling and transportation equipment, and advanced inventory tracking and control systems.
- Law No. 41 focuses primarily on investment attraction and local operation within PPPs, but not necessarily on the effective integration of these operations into the global high-tech supply chain, which requires fast response times and precise logistical coordination.

Although Law No. 41 of 2004 provides a legal and fiscal framework that could be beneficial to various economic activities, its specific applicability to ***The Panama Tech Highway*** project is limited. The law is not designed to address the particular needs of the handling and transit of high-tech raw materials such as microchips.

5. Law No. 18 of June 17, 1948: Creates the Colon Free Zone.

Law No. 18 of 1948 establishes the legal regime for the creation and operation of the Colon Free Zone (CFZ) in Panama. This zone was designed to encourage trade and investment by providing a duty and tax free environment for the import, export and re-export of goods. Its key aspects reveal:

- The FTZ was created to promote international trade through a duty-free regime for the import and export of goods.

- Exemptions from income taxes, import taxes, and other taxes for companies operating within the zone.
- Simplified procedures for the import, export and re-export of goods, including tariff exemptions and logistical facilities.
- Provision of infrastructure and services to facilitate business operations, including warehousing, offices and transportation services.

Among its benefits:

1. The FTZ offers tax exemptions that can significantly come down to lower operating costs for companies handling microchips and other advanced technological components.
2. Simplified customs procedures and tariff exemptions can facilitate the rapid and efficient transit of microchips, benefiting project logistics.
3. The FTZ provides a robust infrastructure and advanced logistics services that can be leveraged for the handling and storage of sensitive technology components.

With respect to its limitations:

1. Although the law provides a favorable framework for international trade, it is not specifically designed for the handling and transit of high-tech raw materials such as microchips.
2. Companies must comply with a number of administrative and operational requirements that may not be fully aligned with the specific needs of the high-tech sector. This includes filing various documents and complying with regulations that may be too general for the specialized demands of handling advanced technological components.
3. Law No. 18 does not provide specific incentives tailored to the needs of the high-tech sector. Although it offers general tax and customs benefits, it does not address the particularities of the transit and handling of sensitive technological raw materials such as microchips, which require highly specialized infrastructures and processes.

Although Law No. 18 of 1948 provides a legal and fiscal framework that could be beneficial to various commercial activities in the Colon Free Zone, its specific applicability to ***The Panama Tech Highway*** project is limited. The law is not designed to address the particular needs of the handling and transit of high-tech raw materials such as microchips.

6. The RECAUCA (Regulations of the Central American Uniform Customs Code)

It was adopted in Panama through Law 26 of 2013, The RECAUCA establishes a common regulatory framework for Central American countries, with the objective of harmonizing and simplifying customs procedures in the region. This regulation has direct implications on the logistics and customs operations that will be carried out in "***The Panama Tech Highway***" project, especially in the handling and transit of high-tech raw materials such as microchips. Among its key aspects:

- Customs will work in partnership with authorized economic operators to optimize the security and facilitation of the international supply chain. This includes the identification and proper handling of high-risk cargo, as well as the regular updating of partnership programs with authorized economic operators.
- Interested companies must go through a self-assessment and joint validation process with the Customs Service. This process ensures that the companies' internal policies and procedures provide sufficient safeguards against contingencies that may threaten their shipments and containers.
- The use of modern technologies is promoted to preserve the integrity of cargo and containers, which is crucial for the handling of high-tech products such as microchips.
- The Customs Service will hold regular consultations with all parties involved in the international logistics chain to discuss matters of mutual interest, including customs regulations and security procedures.

The advantages that are relevant to our proposal:

- RECAUCA promotes the simplification of procedures and the streamlining of customs processes, which can facilitate the rapid and efficient transit of microchips and other high-tech raw materials through Panama.
- The implementation of best security practices and the use of modern technologies will help ensure the integrity of high-tech products during transit, reducing the risk of damage or loss.
- Collaboration and regular communication with the parties involved in the logistics chain can improve the coordination and efficiency of cargo handling, which is beneficial to the project.

In terms of the challenges it represents:

- Companies will have to comply with a number of administrative and operational requirements that may not be fully aligned with the specific needs of the high-tech sector. These include self-assessment and joint validation with the Customs Service.
- Although RECAUCA facilitates trade and improves security, it does not offer fiscal or specific incentives to attract high-tech companies to "***The Panama Tech Highway***" project.

RECAUCA provides a solid foundation for trade facilitation and supply chain security, which is beneficial for the transit of high-tech raw materials through Panama. However, registration and operational requirements can present challenges for companies, and the lack of specific incentives limits its direct usefulness in attracting high-tech investment.

7. **Executive Decree No. 7 of April 30, 2024: Establishing Guidelines for the Development and Promotion of the Microelectronics and Semiconductor Activity.**

Establishes guidelines for the development and promotion of microelectronics and semiconductor activity in Panama. Its objective is to insert Panama into the global semiconductor chain, taking advantage of its geographic position and logistical infrastructure, to generate sustainable and inclusive economic development. It is the previously evaluated regulation, among its key aspects:

- Seeks to develop the necessary capabilities for research, development, production and distribution of semiconductors and microelectronics in Panama.
- Establishes the need for a National Strategy and Action Plan for the development of the semiconductor industry.
- It includes tax incentives, support for research and development, and training of specialized human talent.
- An inter-institutional commission is created to coordinate the implementation of the strategy.
- Establishes a one-stop shop to simplify investment processes in the microelectronics sector.
- It creates a fund to subsidize activities related to the sector.

Among its benefits:

- The decree promotes the creation of infrastructure and advanced capabilities in technological research and development, which is essential for handling advanced technological components such as microchips.
- It offers tax incentives that can come down to lower operating costs and encourage investment in the sector, directly benefiting ***The Panama Tech Highway***.
- The promotion of training programs specialized in semiconductors ensures the availability of qualified personnel for the handling and transit of technological products.
- The creation of a one-stop shop simplifies administrative procedures and facilitates investment, making the establishment of logistics operations for high-tech transit more efficient.

With respect to its limitations and challenges:

- Although the decree includes the development of logistics capabilities, its main focus is the production and design of semiconductors, not specifically the transit and handling of technological raw materials.
- Incentives and support are more oriented to companies that invest in research and development within the country, which may not be fully applicable to companies focused exclusively on logistics and transit.
- Although Panama's logistical capabilities are recognized, the decree does not offer a specific approach or unique incentives for the transit and handling of microchips and other advanced technological components.

Executive Decree No. 7 of 2024 provides a favorable framework for the development of the semiconductor industry in Panama, with significant benefits in terms of infrastructure, tax incentives and human talent training. However, its specific applicability to ***The Panama Tech Highway*** project is limited due to its primary focus on the production and technological development of semiconductors, rather than the logistics and handling of high-tech raw materials such as microchips.

The current tariff structure (SEE APPENDIX 1), with 0% tariff reductions for semiconductors and integrated circuits under multiple free trade agreements, creates a highly favorable fiscal environment for the trade of technological products in Panama, however, the country's

technological infrastructure is not equipped to support the volume and complexity of these advanced products that are expected to transit through the country.

The lack of high-performance data centers, fully deployed 5G networks, and specialized systems for the storage and handling of sensitive technology products, such as microchips and electronic components, severely limits the country's ability to handle these products efficiently and reliably. This infrastructure gap not only slows down the processing and handling of technology products, but also increases operating costs for businesses, which could deter investors from taking advantage of the tax benefits that Panama offers.

Infrastructure deficiencies are compounded by administrative and bureaucratic inefficiencies that characterize Panama's document and physical review processes. Although the tariff framework is competitive, delays in the inspection of documents and goods, exacerbated by manual processes and excessive bureaucratic controls, contribute to significant delays in the logistics chain. This problem is particularly critical for technology products that require fast and accurate handling due to their specialized and, in many cases, perishable or sensitive nature.

Logistics delays generated by the combination of inadequate infrastructure and slow administrative processes have a direct impact on Panama's competitiveness. In a global marketplace where speed and efficiency are crucial, every day of delay represents a loss of economic opportunity and can be the difference between choosing Panama or a competitor as a transit point.

Comparison of Panama's Infrastructure vs. Other Countries Developing in the Sector

Panama offers a highly competitive tariff structure, with 0% tariff reductions for semiconductors and integrated circuits under multiple free trade agreements. This fiscal environment is especially favorable for trade in advanced technological products, positioning Panama as a strategic transit point for these goods. However, limitations in technological infrastructure and administrative inefficiencies significantly erode this potential.

Technological Infrastructure:

- **Lack of High Performance Data Centers:** Panama lacks the necessary infrastructure to handle large volumes of data and perform fast processing of transactions involving sensitive technology products.

- **Incomplete 5G Networks:** Although Panama is in the process of deploying 5G networks, their implementation is not complete or robust, which limits connectivity and efficiency in the management of the advanced technology supply chain.
- **Specialized Storage Systems:** The absence of dedicated storage facilities for sensitive technology products, such as microchips, increases operational risks and costs for companies.

Administrative Inefficiencies:

- **Inspection Delays and Manual Processes:** Slow and manual administrative processes, coupled with excessive bureaucratic controls, create significant delays in the review of documents and goods. This is critical for products that require fast and accurate handling.
- **Competitiveness Impact:** These deficiencies not only increase operating costs, but also diminish Panama's reliability as an efficient logistics hub, leading potential investors to consider alternatives in the region.

Uruguay: Infrastructure and Administrative Efficiency

Uruguay, as another emerging player in Latin America, has made significant advances in infrastructure and logistics efficiency, seeking to attract technology companies and consolidate its position as a regional hub.

1. **Technological Infrastructure:**

- **Modern Data Centers:** Uruguay has invested in the creation of high-capacity data centers, which has attracted international companies that require processing and storage of large volumes of data.
- **Deployment of 5G Networks:** Although in initial phases, Uruguay has begun to deploy 5G networks with a focus on strategic areas for commerce and technology, facilitating connectivity and improving operational efficiency.
- **Specialized Logistics Infrastructure:** Uruguay has developed free trade zones with specialized infrastructure for handling technology products, including controlled storage and advanced supply chain management.

2. **Administrative Efficiency:**

- **Digitized Procedures:** Unlike Panama, Uruguay has digitized many of its customs and logistics processes, coming down to reducing waiting times and eliminating bottlenecks in the logistics chain.
- **Expedited Mechanisms:** Uruguay has implemented single window systems that allow for the rapid review of documents and goods, improving efficiency and attracting investors who value speed in operations.

3. **Regional Competitiveness:**

- **Investor Attraction:** The combination of advanced infrastructure and administrative efficiency has allowed Uruguay to position itself as a viable alternative to other logistics hubs in the region, challenging Panama's position.

Developed Countries: Competitiveness Standards

Compared to developed countries such as Singapore, the Netherlands and Germany, the differences in infrastructure and logistics processes are even more pronounced.

Advanced Technological Infrastructure:

- **Data Centers and 5G Networks:** Countries such as Singapore and Germany have state-of-the-art data centers and fully functional 5G networks, facilitating the handling of large volumes of data and improving global connectivity.
- **World-Class Logistics Infrastructure:** Specialized warehousing facilities, advanced automation technology, and real-time inventory management systems are standard in these countries, allowing for a frictionless and efficient operation.

Administrative and logistical efficiency:

- **Automated Processes and Digitalization:** The automation of administrative processes and the complete digitalization of customs and logistics procedures in these countries minimizes waiting times and human errors, increasing competitiveness.
- **Real-Time Tracking Systems:** Developed countries use advanced real-time tracking systems to manage their supply chains, allowing full visibility and agile handling of goods.

Global Competitiveness:

- **Global Logistics Hubs:** The combination of advanced infrastructure, administrative efficiency and a favorable regulatory environment has allowed these countries to consolidate their position as the most competitive logistics hubs in the world.

The materialization of the *Panama Tech Highway*

A review of the applicable regulations, including Law No. 54 of 1998, Law No. 41 of 2007, Law No. 59 of 2008, Law No. 41 of 2004, Law No. 18 of 1948, RECAUCA and Executive Decree No.7 of 2024, reveals that, although these laws and regulations offer fiscal, administrative and operational benefits, none are specifically aligned with the needs of the handling and transit of high-tech raw materials such as microchips. The following are the key points that justify the need for a new legislative initiative:

1. **Specific Needs of the High-Tech Sector**

- Current laws do not adequately address the need for specialized infrastructures for the handling and storage of microchips and other advanced technological components.
- The handling of high-tech components requires fast and safe processes, with advanced monitoring and control, which is not fully covered by current regulations.

2. **Specific Incentives**

- Although the laws offer general tax incentives, they do not provide specific benefits for companies in the high-tech sector, which is crucial for attracting investment in this field.
- Existing laws offer some facilities, but a new legislative initiative could provide specialized permits and visas to attract highly skilled human talent in technology.

3. **Simplification and Adaptation of Procedures**

- It is essential to implement a single window specifically adapted for technology companies, which simplifies and speeds up administrative and customs procedures.
- Adapt administrative requirements to align them with the specific needs of technology companies, avoiding unnecessary obstacles.

4. **Promotion of *Nearshoring***

- Panama, with its privileged location, can become a regional hub for high-tech transit, attracting companies looking to relocate their operations close to their main markets.

- New specific legislation can position Panama ahead of other countries in the region, offering a more attractive and competitive environment for high-tech companies.

5. Integration without Conflicts with Other Sectors

- The new legislation should be designed to complement existing free trade and free zones, ensuring that the benefits offered do not generate conflicts or negatively affect other logistics and commercial sectors.
- Promote cooperation between different sectors and economic areas to create synergies that benefit the entire Panamanian economy.

6. Examples of Specific Benefits

- Exemption of import duties and taxes for equipment, technology and raw materials necessary for the handling and transit of microchips and other advanced technological components.
- Significant reduction of income tax and other national taxes for companies that establish themselves in "***The Panama Tech Highway***" and obtain the license to operate in the transportation and handling of microchips.
- Partial funding and grants for the construction and improvement of specialized facilities, including temperature- and humidity-controlled warehouses, high-precision handling facilities, and advanced security systems.
- Implementation of specific training and professional development programs for personnel involved in the handling and transit of high-tech raw materials, ensuring the availability of highly qualified labor.
- Granting of visas and special work permits to attract and retain human talent specialized in microchip technology and advanced logistics.
- Offer discounts and subsidies on logistics services, including transportation, warehousing and cargo handling, for technology companies operating in the hub.
- Tax incentives and financing for research and development projects related to the improvement of logistics processes and management of advanced technological components.
- Facilitating the attainment of international quality and safety certifications, ensuring that operations meet the most demanding global standards.
- Priority access to critical transportation infrastructures, such as airports and ports, to ensure speed and efficiency in the transit of technological components.

- Creation of a fund for technological innovation in logistics and high-tech handling, supporting pilot projects and new technologies that improve the efficiency and safety of operations.

Therefore, promoting a new legislative initiative that offers specific benefits for "***The Panama Tech Highway***" is essential for Panama to position itself as a regional leader in the handling and transit of high-tech raw materials. This legislation should be designed to complement existing regulations, avoid conflicts with other sectors and promote *nearshoring*, taking advantage of Panama's strategic location and advanced logistics capabilities. Doing so will attract investment, generate specialized jobs and boost the country's technological and economic development.

If we are serious about our mission to become a logistics hub for the semiconductor and microchip industry, we need to legislate specifically on the subject. Initiatives such as Law 54 of July 22, 1998 for the legal stability of investment in Panama could be adapted to establish exceptions to the minimum investment amount. High technology is classified by its level of investment in research and development, now, the complexity of products such as microchips and specialized *software* generates the need for highly skilled labor, which is why industries such as microelectronics, biotechnology, ICT, and robotics are considered highly specialized. These industries could be exempted from the minimum investment of two million balboas due to their value in innovation and technological development, even though their investment in physical infrastructure may be lower.

Structure of the Legislative Proposal

The Panama Tech Highway must have its legal basis in a Bill that establishes a regulatory framework and a Decree Law that develops each of the needs required to strengthen the infrastructure and administrative processes that arise as a result of becoming a logistics hub for the technology sector. The development of the legislation should be oriented to structure the following aspects:

1. Benefits for Companies

- Reduction of taxes and tariffs for companies operating in ***The Panama Tech Highway***, limiting the actors to companies that operate specifically in the technology industry. Establish specific tax incentives so that they are directed to the potential foreign investment of companies in the development of microchips and semiconductors.

- Simplification of customs procedures and processes. Establish new regulations and regimes aimed at eliminating bureaucracy and facilitating administrative procedures associated with the technology industry.
- Access to support and financing programs. Complement tax incentives with programs to support domestic and international investment in the microchip and semiconductor industry.
- Establish technology free zones. Create an environment conducive to innovation that makes investment in technology attractive.

The essential aspect of this aspect will be to create regulatory stability for companies. A clear definition of the benefits, responsibilities and legal scope of the legislation will be key for Panama to become an optimal hub for the transportation of microelectronics-related goods.

2. License to Operate

Companies will need to obtain a specific license to operate on ***The Panama Tech Highway***, complying with all legal and regulatory requirements.

- They will require security and compliance certification to ensure proper handling of technological materials and compliance with all international security regulations, through authorized economic operation programs and secure trade alliance certifications.
- The licenses will establish the specification of the activities authorized under said document, together with the limitations and restrictions.
- It will contain the obligations that the company must comply with in terms of cybersecurity, data protection, environmental standards and quality control.
- An investment commitment related to the level of investment to be made by the company within the hub will be established.
- The company's responsibility to create a certain number of jobs, with emphasis on hiring local talent, will be linked to the company's responsibility to create a certain number of jobs, with emphasis on hiring local talent.
- Licenses will be granted subject to environmental impact management responsibilities.

These considerations guarantee a fruitful development of the technology *hub* while aligning it with Panama's economic and technological development objectives.

3. Training:

Training is the key to the intellectual growth of the personnel that will operate within ***The Panama Tech Highway***. Current legislation emphasizes training in terms of the technological sector, but training in customs procedures and the logistics sector is also necessary to exploit our strengths and guarantee the sustainability of the hub. The following will be required:

- Semiconductor and microchip knowledge training.
- Familiarization with the use of technological equipment and devices.
- Training programs to improve the skills of customs personnel.
- Financing for education and training in foreign trade and international regulations on technological trade.
- Training in cyber security protocols and handling of sensitive products.
- Implementation of a digital customs management system and training in the use of advanced electronic systems.
- Training in logistics and supply chain management for the optimization of customs transit.
- Implementation of a single window to streamline and facilitate foreign trade.

4. Financing and Donations

Decree Law 7 has opened the possibility for the National Fund for the Semiconductor and Microelectronics Industry of Panama to receive tax-deductible donations from private entities and international organizations. The current legislation can be complemented with:

- Provisions regulating subsidies and financing programs for companies and universities that develop advanced microelectronics technologies.
- The possibility of granting tax credits to companies that invest in the development of microelectronics.
- Formalize a registry for donations to ensure that they come from legitimate sources and promote transparency and accountability.
- To legislatively develop public-private collaboration specific to the technology sector, promoting strategic alliances for the financing of microelectronics projects.
- Incentives for innovation and projects that promote research and development in the technology sector.
- Regulate the formal financing of educational programs and training in microelectronics.

5. Diligences and Control

Control mechanisms are imperative in industries such as this where safety plays a crucial role. It is necessary that legislative efforts contemplate due diligence measures and control mechanisms for the processes that will be carried out in ***The Panama Tech Highway***. It is necessary to contemplate the implementation of:

- Due Diligence: due diligence procedures for the fight against Money Laundering, Financing of Terrorism and Proliferation of Weapons of Mass Destruction.
- Control through high-tech mechanisms to ensure security in the dynamics of access to computer systems for customs operations.
- Keep a digital registry for the authentication of companies where a review of their structure and compliance history is made.
- Verification procedures to ensure that customers and final recipients of technology products comply with all applicable regulations and are not involved in illegal or high-risk activities.
- Measures to ensure the protection of sensitive information with robust cybersecurity strategies.

The Panama Tech Highway proposal is a comprehensive legislative initiative that serves as a strategic framework for the development of the technology industry, to position ourselves as active agents within the value chain of microchips and semiconductors. It is the opportunity for a regulation that addresses everything from attracting investments and strengthening human capital to the required technological infrastructure. Its main purpose is to boost Panama's economic and intellectual growth, to enter the technological panorama to establish ourselves as a power in logistics of products related to microelectronics.

ANNEX I. Current Official Tariff for Raw Materials

The analysis of the tariff structure for semiconductors and integrated circuits shows a favorable fiscal policy for the import and re-export of these products in Panama. Import duties (IAD) for all listed products are 0%, which significantly comes down to lower entry costs. However, the products are subject to a 7% ITBMS and 5% ISC, taxes that could impact competitiveness if not properly managed within the context of a logistics hub.

In addition, the 0% tax exemption in free trade agreements (FTAs) with multiple countries, including the United States, the European Union, South Korea, and several Latin American countries, reinforces Panama's position as an attractive destination for the transit of technological products. This relief facilitates the movement of goods between countries without the additional burden of customs duties, thus fostering smoother and more economical trade.

The following is the tariff structure for different types of semiconductors and integrated circuits, including tariff fraction, description, applicable taxes, and countries with free trade agreements that allow 0% duty-free treatment:

TARIFF FRACTION	DESCRIPTION	APPLICABLE TAXES	FTA COUNTRIES (0% DEGRAVATION)
854231110000	Metal oxide semiconductors (MOS technology).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854231120000	Bipolar technology circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854231190000	Others (including circuits combining MOS and bipolar technologies (BIMOS technology)).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.

854231200000	All others except digital.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854231300000	Hybrid integrated circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854231800000	Waste and scrap.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854232110000	Metal oxide semiconductors (MOS technology).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854232120000	Bipolar technology circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854232190000	Others (including circuits combining MOS and bipolar technologies (BIMOS technology)).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854232300000	Hybrid integrated circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.

854233110000	Metal oxide semiconductors (MOS technology).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854233120000	Bipolar technology circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854233190000	Others (including circuits combining MOS and bipolar technologies (BIMOS technology)).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854233300000	Hybrid integrated circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854239110000	Metal oxide semiconductors (MOS technology).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854239120000	Bipolar technology circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854239190000	Others (including circuits combining MOS and bipolar technologies (BIMOS technology)).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.

854239200000	All others except digital.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854239300000	Hybrid integrated circuits.	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.
854233110000	Metal oxide semiconductors (MOS technology).	• DAI: 0% • ITBMS: 7%. • ISC: 5%.	Argentina, Bolivia, Brazil, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, European Union, Guatemala, Honduras, Iceland, Israel, Liechtenstein, Mexico, Nicaragua, Norway, Paraguay, Peru, Singapore, South Korea, Switzerland, Taiwan, United Kingdom, United States, Uruguay.