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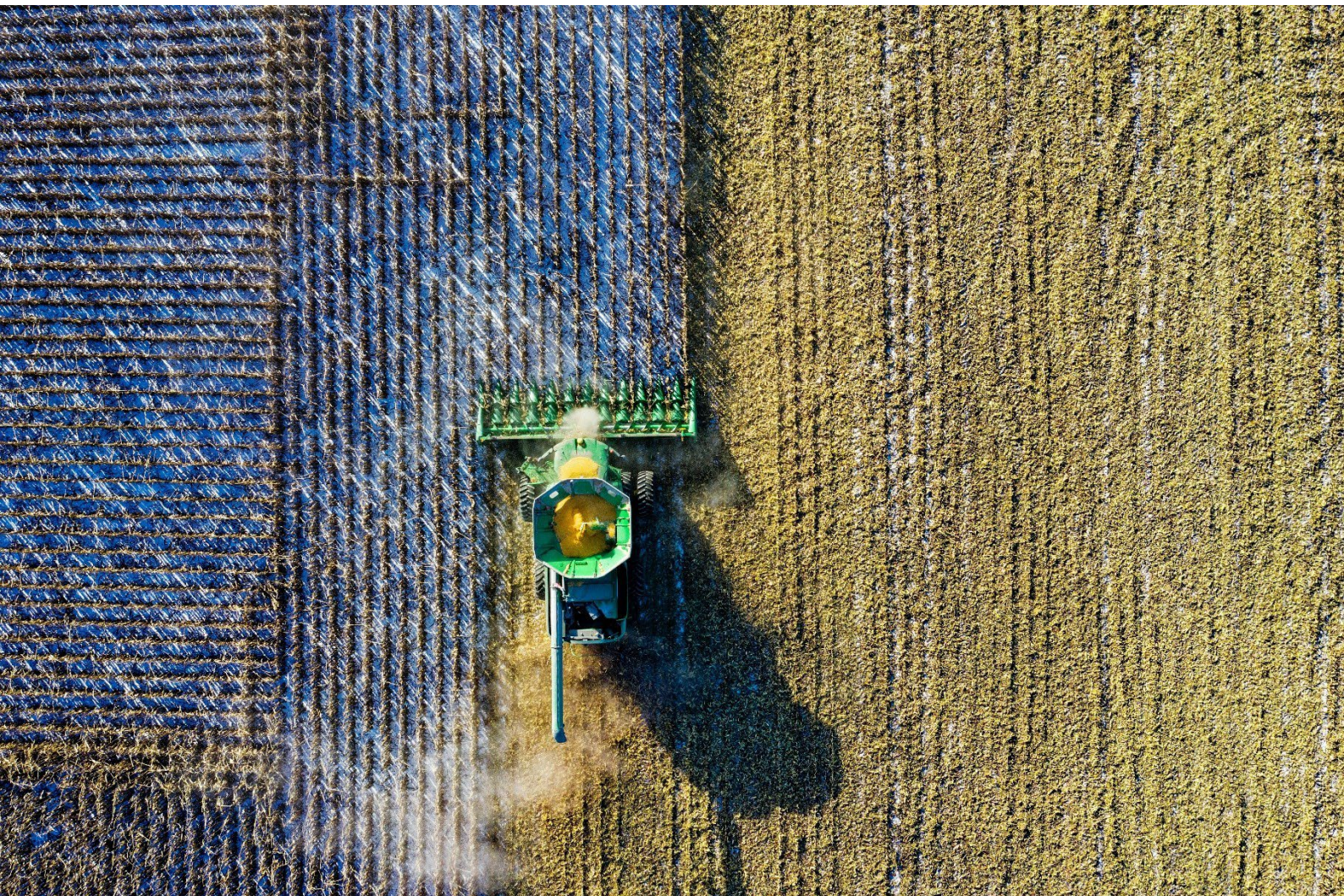
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Acronyms

ACI	Central America Import Tariff
AGEXPORT	Agricultural Exporters Association
AIC	Computerized Central Tariff
AIS	Agriculture Innovation System
APEN	Nicaraguan Exporters Association
CACM	Central American Common Market
CATIE	Tropical Agronomic Center for Higher Education and Research
CBD	Convention on Biodiversity
CENTA	National Center for Agricultural and Forestry Technology
CIAT	International Center for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
CINDE	Costa Rican Investment Promotion Agency
DIRTA	Directorate of Agricultural Science and Technology
ECLAC	Economic Commission for Latin America and the Caribbean
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign direct investment
FHIA	Honduran Foundation for Agricultural Research
FIDE	Foundation for investment and exports development
FTZ	Free Trade Zones
GDP	Gross Domestic Product
GIS	Geographical Indications
GPS	Global Positioning System
GRASP	Global Risk Assessment for Social Practices
ICTA	Institute of Agricultural Science and Technology
IDIAP	Agricultural Research Institute of Panama
IHCAFE	Honduran Coffee Institute
IICA	Inter-American Institute for Cooperation on Agriculture
INIAs	National institutes for innovation in agriculture
INTA	Nicaraguan Institute of Agricultural Technology
LAC	Latin America and the Caribbean
MFN	Most Favored Nation
MNCs	Multinational Corporations
MRL	Maximum Residue Limits
OECD	Organization for Economic Co-operation and Development
PCC	Central America Cacao Project
PROCOMER	Costa Rican Foreign Trade Promotion Agency
PROMECAFÉ	Regional Cooperative Program for Technological Development and Modernization of Coffee Growing
R&D	Research and Development
SAN	Sustainable Agriculture Network
SICA	Central American Integration System
SMEs	Small and medium-sized enterprises
SMETA	Sedex Members Ethical Trade Audits
SPS	Sanitary and Phytosanitary Measures
UNAG	National University of Agriculture
UNESCO	United Nations Educational, Scientific and Cultural Organization

USA	United States of America
USAID	United States Agency for International Development
WTO	World Trade Organization

Executive Summary

Objectives of the Study

The purpose of this study is to describe the current challenges for innovation in Central America with a particular emphasis on agricultural value chains and their saliency when prescribed to the entire sector. This study provides an analysis of innovation strategies and ecosystems for sustainable agriculture in the region that includes the identification of market failures and possible interventions. Furthermore, it makes an analysis of the export and investment potential of European companies in priority areas and recommends market access strategies for European SMEs.

Before delving into these specificities, the circumstantial environment of the market within the region must be thoroughly understood. The remainder of this section will summarize the status of the market in the region, its opportunities, its barriers, and lastly, a set of recommendations for action that stakeholders can abide by when dealing with the sector.

General overview of the Sustainable Agriculture Sector in Central America

Agriculture in Central America is one of the most important sectors due to its economic, social, and environmental contributions. It also serves as the main employer and the largest generator of foreign exchange within the region. Above all however, it is foreseen as one of the few viable activities for value generation in rural areas. Specifically, its contribution to GDP is especially significant in all the countries studied. Lastly, alluding to the identification and selection of value chains, Central America has been a historical producer of tropical fruits, coffee, livestock products and tropical roots. These specific products will be highlighted by country to assess their individual processes and degree of sustainability/ adherence to standards conducive for innovation. Because of this, the status of the agricultural sector is highly dependent on the technological innovations that would allow the former to consolidate itself further. Currently the markets for innovation technologies and specialized agricultural inputs are estimated at approximately \$ 2.5 billion, further highlighting the potential of participating in it.

Additionally, throughout the study, we highlight and analyze the existing criteria of evaluation of the Agricultural sector in the region. This snapshot can be generalized for the sake of synthetization into the following points: Trade potential: Clearly, the region has been successful in the export of coffee, bananas, and more recently pineapple. Export success denotes a revealed comparative advantage, which is key to the sustainability of production processes. Employment, or lack thereof: is one of the main problems in the region and is closely related to the incidence of poverty in households in the region. Domestic value added in exports: parallel to the generation of employment, the potential for production chains determines the stimulus to the economic activity of the entire region. And the relative weight in the economy: The three activities that make up the bulk of agriculture production ensures working with "critical mass" and the mobilization of resources and assets for the development of business promotion and investment attraction. Overall, it is key to highlight that, in terms of the overview of the sector, there is clear potential towards achieving sustainability through innovation.

Opportunities

Congruently, delving into the specific opportunities of the sector, Central America has the potential to become a "world class" international platform for the production, processing, and exporting of highly developed agricultural products with a sustainability focus. European firms equally process the potential to seize the commercial opportunities that lie within these aspirations. EU firms already play an important role as suppliers of high-quality sowing seeds,

certain quality insecticides and specialized machinery. However, it faces fierce competition with US, Brazilian and Chinese companies.

There are further opportunities which include smart irrigation, GPS and GIS technologies, computerized greenhouses, vertical farms, livestock tracking, mobile price monitoring apps, and some Fintech apps with new digital payment methods, among others. And as for investment opportunities, several sectors stand out. These include biotech, bioenergy, mariculture, sustainable proteins, genetics and hybridization, and the export of specialty products: coffees, cacao, tropical fruits and low carbon beef and dairy.

Current strategies to advance sustainability through innovation involve a clear emphasis on improving the total productivity of factors in agriculture. Productivity determines farmer's income and the rate of return on investments. If agricultural producers are to live better and more resources are to be transferred to agriculture, productivity must be increased. It is through this scope of productivity that both the opportunities and challenges must adhere to.

Lastly, as mentioned, market opportunity for the region in agricultural machinery and other inputs is close to \$2 billion. Early mover investors would get an advantage since the number of attractive deals and more mature startups is currently limited. Based on interviews made, the following activities are highlighted to be where are the most future investment in the region will come to. These are: Mariculture and freshwater aquaculture, Biotech and circular economy, Sustainable proteins, Genetics, and hybridization research, Bioenergy, and Specialty products.

Barriers and challenges

Concluding from the results of the study, productive development challenges for the agricultural sector in Central America can be divided into the following categories. Firstly, institutional challenges have to do with rules, conventions, arrangements, or coordination mechanisms that have an impact on the development of rural production sectors. Challenges regarding environmental sustainability to make activities more sustainable whilst emphasizing climate change mitigation and adaptation. Commercialization challenges that area have to do with market conditions that have an impact on the ways in which rural products and services can be brought to market and on producers' access to local, intraregional, and extra regional markets. And lastly, productivity and innovation challenges which that have an impact on productivity and innovation in the rural environment include the size of the enterprise, technological performance, education, and training, what innovative activities are being developed and access to financing.

As highlighted in the previous point, the private sector plays an important role in generating new agricultural and technological knowledge in the region. The largest agricultural companies manage their own research projects with specialized technicians and modern laboratories seeking permanent innovation that allows them to maintain high productions. However, when compared to developed countries, the resources invested in research by the private sector are still low. This lack of foreign investment by private companies is coupled by the existing gaps in R&D development infrastructures.

Overall, to increase production and employment, there is an increasing need for investment, but this is not generated spontaneously. The basic factors of production are shared by countries with similar characteristics that compete with Central America. The solution is found in differentiation through the social, environmental, and institutional attributes that make these countries unique. However, the Achilles heel of investment attraction policies continues to be geographic and sectoral concentration and its small impact on the periphery. Factor endowment in metropolitan areas and its business climate are very different from those found in rural areas, especially regarding the workforce and infrastructure. Therefore, the type of

companies that settle today cannot be expected to establish themselves outside major cities. Specific and differentiated policies are needed to serve agriculture and related industries.

Recommendations for Action for the EU and European Stakeholders

EU firms should consider their own resources, previous export, or business experience abroad, and long-term business strategy before entering the Central American market. European products and services enjoy an excellent reputation in the region. One of the most common market entry options is finding a local agent or distributor. Other approaches include licensing, franchising, and identifying local partners with market knowledge and contacts.

One way to help European SMEs succeed in Central America's priority sectors related to agriculture is to develop comprehensive market entry or expansion plans, learn about export- and customs-related requirements, obtain export financing, and identify potential partners, agents, and distributors through business matchmaking programs, trade shows, and trade missions led by EU affiliate business associations. These activities should include one-on-one meetings with pre-screened buyers; potential customers or end-users; experienced professional services providers; and key government officials. With these tools, EU small and medium firms will be better positioned to take advantage of opportunities in Central America.

To summarize, EU firms could actively look for investment opportunities in Central America by promoting, through the different means described throughout the study, the following practices. Firstly, the generation of more and better jobs, then, the attraction of investment to rural areas, the continuous expansion and diversification of the export supply, changes in markets and consumer preferences, and now clearer than ever, and finally, adaptation and mitigation to climate change.

1. Introduction

The Central American agricultural sector is key in providing employment in rural areas, in contributing to GDP growth, and plays a fundamental role in promoting sustainable development for rural communities. However, its weaknesses are well known, including low productivity and a large environmental footprint.

The agricultural sector has been the traditional trade and investment link between Central America and the European Union. Current consumption trends in the European Union and in the main export markets suggest the need for a transformation of Central American agriculture towards the full incorporation of social and environmental attributes in its products, which places EU firms in a privileged position to provide inputs and services according to these needs.

Moreover, the relative scarcity of capital and the alignment of sustainability goals between the regions, opens investment opportunities for EU firms in Central American agriculture. The depth and maturity of the agricultural ecosystem, including public agencies, world-class universities, and leading firms, constitute an obvious platform for generating opportunities towards innovation for sustainable development.

Central America has the potential to become a “world class” international platform for the production, processing, and exporting of highly developed agricultural products with a sustainability focus. European firms could seize the commercial opportunities that lie within these aspirations.

The markets for innovation technologies and specialized agricultural inputs are estimated at approximately \$ 2.5 billion. EU firms play an important role as suppliers of high-quality sowing seeds, certain quality insecticides and specialized machinery. However, it faces fierce competition with US, Brazilian and Chinese companies. There are further opportunities which include smart irrigation, GPS and GIS technologies, computerized greenhouses, vertical farms, livestock tracking, mobile price monitoring apps, and some Fintech apps with new digital payment methods, among others.

As for investment opportunities, several sectors stand out. These include biotech, bioenergy, mariculture, sustainable proteins, genetics and hybridization, and the export of specialty products: coffees, cacao, tropical fruits and low carbon beef and dairy.

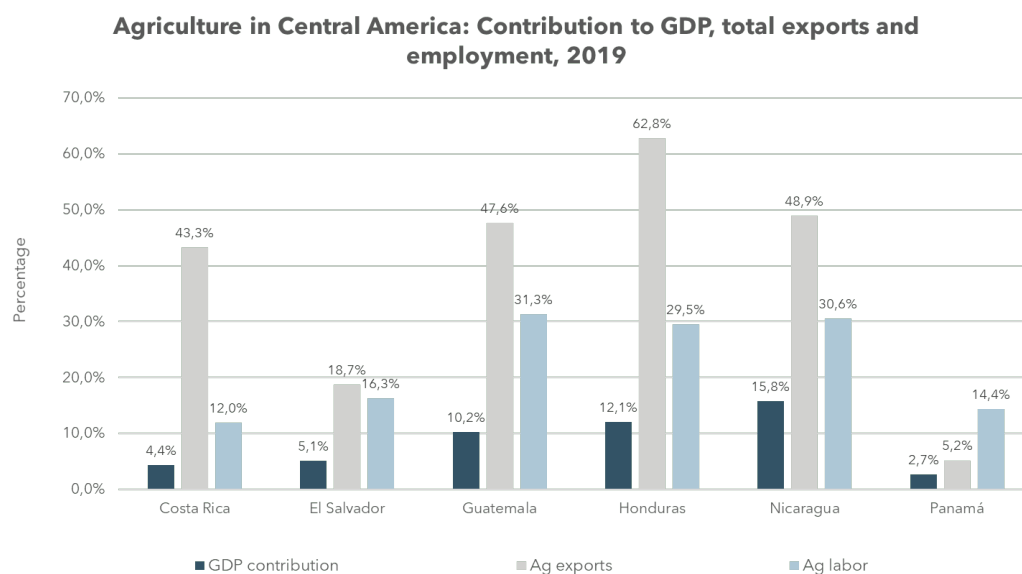
This report describes the current challenges for innovation in Central America with a particular emphasis on four agricultural value chains: coffee, cacao, beef and dairy livestock, and tropical fruits. It provides an analysis of innovation strategies and ecosystems for sustainable agriculture in the region that includes the identification of market failures and possible interventions. Furthermore, it makes an analysis of the export and investment potential of European companies in priority areas: agrochemicals, seeds, agrotechnology and machinery and recommends market access strategies for European SMEs.

2. Analysis of innovation strategies and ecosystems for sustainable agriculture in the region

2.1. Agriculture in Central America

Agriculture in Central America is one of the most important sectors due to its economic, social, and environmental contributions. It is the main employer, the largest generator of foreign exchange and one of the few viable activities in rural areas. Its contribution to GDP is especially significant in Honduras and Nicaragua, where it exceeds 12%. In Costa Rica, Guatemala, Honduras and Nicaragua, the share of agriculture in total exports exceeds 40%. Agricultural employment is particularly important for Guatemala, Honduras, and Nicaragua where it represents around 30% of total labor.

Figure 1. Agriculture in Central America: Contribution to GDP, total exports, and employment, 2019.



Source: *The World Bank, 2021.*

According to ECLAC (2017) productive development challenges for agriculture in Central America can be divided into four categories:

- i. Institutional challenges: These challenges have to do with rules, conventions, arrangements, or coordination mechanisms that have an impact on the development of rural production sectors.
- ii. Environmental sustainability challenges: Ways need to be found to make rural production activities more environmentally sustainable, with emphasis on climate change mitigation and adaptation.
- iii. Commercialization challenges: Challenges in this area have to do with market conditions that have an impact on the ways in which rural products and services can be brought to market and on producers' access to local, intraregional, and extra regional markets.
- iv. Productivity and innovation: Factors that have an impact on productivity and innovation in the rural environment include the size of the enterprise, technological performance, education and training, what innovative activities are being developed and access to financing. This category also includes the challenges associated with efforts to strengthen value chains.

Current strategies to advance sustainability through innovation involve a clear emphasis on improving the total productivity of factors in agriculture. Productivity determines farmer's income and the rate of return on investments. If agricultural producers are to live better and more resources are to be transferred to agriculture, productivity must be increased.

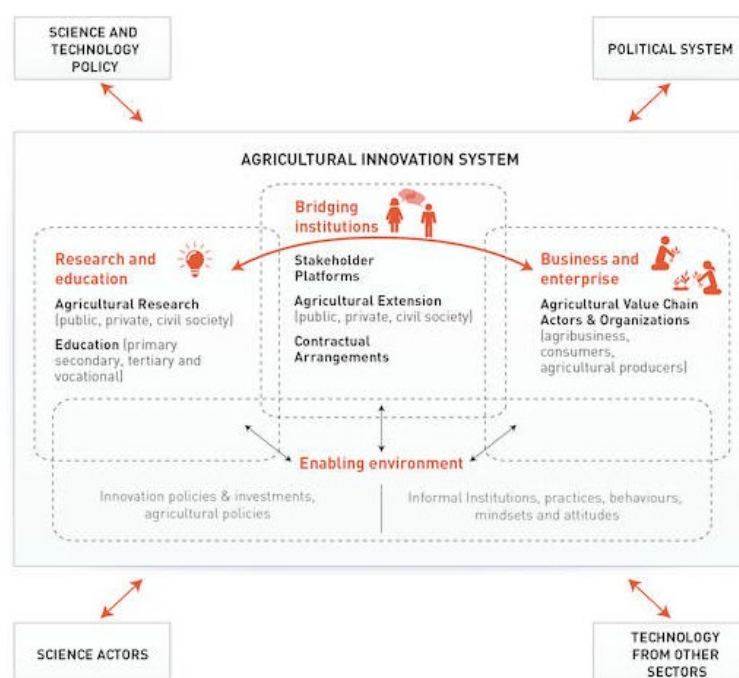
Experts interviewed for this report agreed on the following actions to transform challenges into opportunities:

- Promotion of market efficiency at all levels, including inputs products and related services.
- Product diversification for increased productivity.
- Value added strategies including environmental and social attributes to agricultural production.
- Improve environmental management at all levels of activity.
- The development of specialized factors, including workforce; direct transfer and generation of world-class technologies applied to the different activities of the sector; and coordination among public and private sectors; and adequate long-term financing options.
- The establishment of the highest performance standards in terms of quality, safety, health, and environmental management.

2.2. Innovation for sustainable agriculture public policies, strategies, and projects

Agricultural research and development (R&D) is a key factor in achieving agricultural advances towards sustainable development through a wide range of mechanisms and tools, including technological innovation. All the countries of the region have organizations dedicated to agricultural research, which generally depend on the governments. These organizations form part of the Agriculture Innovation System (AIS). AIS is a network of actors (individuals, organizations, and enterprises), together with supporting institutions and policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share, and use knowledge as well as jointly learn (Aerni et al, 2015).

Figure 2. Structure of an Agriculture Innovation System.



Source: Aerni et al, 2015.

In Central America, the most important actors related to innovation in agriculture are the public entities dedicated to innovation in agriculture, government led institutions known as national institutes for innovation in agriculture (INIAs for its acronym in Spanish). These are:

- Costa Rica: National Institute for Innovation and Transfer in Agricultural Technology (INTA).
- El Salvador: National Center for Agricultural and Forestry Technology (CENTA).
- Honduras: Directorate of Agricultural Science and Technology (DICTA).
- Guatemala: Institute of Agricultural Science and Technology (ICTA).
- Nicaragua: Nicaraguan Institute of Agricultural Technology (INTA).
- Panama: Agricultural Research Institute of Panama (IDIAP).

In all countries, public agricultural research is complemented by universities, both public and private, as well as by international organizations. In Costa Rica, the University of Costa Rica, the National University, and the Technological Institute of Costa Rica are public universities worth mentioning. In the private sphere, there is EARTH, an international university specialized in tropical agriculture and The Tropical Agronomic Center for Higher Education and Research (CATIE for its acronym in Spanish), which is an international public organism, has its headquarters in Costa Rica. In Honduras, there is the Honduran Foundation for Agricultural Research (FHIA for its acronym in Spanish), the Pan-American Agricultural School "El Zamorano" and the National University of Agriculture (UNAG for its acronym in Spanish).

Figure 3 presents a summary of the number of actors in the different categories of the Agriculture Innovation System in Central America.

Figure 3. SIA structure in Central America.



Within the private sector, input suppliers are the most important set of actors. Even though the market for agricultural inputs is reasonably well developed, there are concerns about the quality of inputs and their prices. Above all, private sector manifests that agrochemicals registration often involves a process with many steps and actions, both by the applicant for registration as well as by the registration authority. They go from the initial submission of the application by the applicant to the final registration decision by the registrar and subsequent follow-up activities by both entities. The registration process can therefore be lengthy and cumbersome. Marketing is the driving force for the increasing number of inputs whose quality and effectiveness are rarely tested by government agencies.

The situation is worrying regarding the market for agricultural services to foster innovations in agriculture. In very few cases, private technical assistance is provided by specialized professionals, firms, and producer organizations. Veterinary services and equipment repairs are reasonably established. Other services such as soil, water and tissue tests and information services are missing, or limited to the agro-export sector. The informality in agriculture is one of the factors that limits the development of a market for agricultural services that could contribute to innovations and therefore to competitiveness (Pomareda, 2019).

The private sector also plays an important role in generating new agricultural and technological knowledge in the region, through its own research or the hiring of external consultants or the adoption of innovations developed in other countries. The largest agricultural companies manage their own research projects with specialized technicians and modern laboratories seeking permanent innovation that allows them to maintain high productions. However, when compared to developed countries, the resources invested in research by the private sector are still low.

According to UNESCO data, Costa Rica is the country in the region with the highest investment in R&D in proportion to its GDP, reaching 0.49% of GDP, which when compared with other countries in America such as Argentina (0.61% of GDP), Brazil (1.34% of GDP) and the United States (2.74% of GDP) is still low. The rest of the countries in the region have a lower investment in R&D: El Salvador with 0.15% of GDP, Nicaragua 0.11% of GDP, Guatemala 0.03% of GDP, and Honduras 0.01% of GDP. In particular, the region also registers a low relative investment in agricultural research (ASTI, 2016)

Based on ASTI (2016), the Central American countries compared to the rest of Latin America and the Caribbean (LAC), operate with smaller agricultural innovation systems. Costa Rica reaches the highest investment with 1.06% of agricultural GDP and 241 researchers. Panama follows with 0.74% of the Agricultural GDP and 133 researchers. However, these values are relatively low when compared with countries in Latin America such as Argentina or Brazil that achieve an investment in agricultural research of 1.33% and 1.96% of the Agricultural GDP respectively, each country with about 5,700 researchers. Strengthening agricultural research and development in Central America is an important factor in promoting and fostering technological innovation in the broad sector of agriculture and food.

Central American agricultural policy (figure 4) recognizes current challenges faced by the agricultural sector regarding the improvement of economic, production performance and the strengthening of value chain competitiveness and the adaptation to climate change, are directly related to the low investments made by the region in agricultural research, development and innovation (R+D+I) in recent years (Agricultural Policy for the SICA Region 2019-2030). Most importantly, Central American agricultural policy objectives explicitly promote and address innovation and sustainability as main drivers of agricultural competitiveness.

Figure 4. Objectives of Agricultural Policy for the SICA Region 2019-2030.

Source: Agricultural Policy for the SICA Region 2019-2030.

2.3. Identification of market failures and possible interventions

The Central American agricultural economy faces substantial challenges: increased productivity, continued expansion and diversification of the export supply, climate change mitigation and adaptation, attracting investments to rural areas, generating more and better jobs, and institutional transformation. To overcome these challenges and take advantage of commercial and investment opportunities, market failures must be identified and addressed.

There are two main market failures that affect agriculture in Central America. The first has to do with coordination problems. This type of failure is known as "chicken or egg". These refer to situations when the market cannot provide by itself some activity or input that is vital for the performance of the value chain. Clearly, in Central America there are problems in the provision of innovation and services for innovation. As already established, total investment in R&D is relatively small and the public sector has little room to maneuver from the fiscal point of view.

Barriers for innovation include small - scale local markets, lack of critical mass of professionals, and lack of specialization. To overcome this, private sector has assumed a larger role in developing improved technology for agriculture. Major drivers have been new commercial opportunities granted by scientific advances and liberalization of agricultural input markets. Along with rising private R&D investment, agricultural input industries have undergone significant structural changes (concentration and expansion). The rising importance of private R&D, however, does not imply a diminished role of the public sector in the region which still is most relevant.

One way to solve it is through the figure of clusters. A cluster is "a geographically concentrated group of companies and institutions, linked by common and complementary interests" (Porter 1990). The cluster acts on the value chain as a productive system and focuses its actions on solving deficiencies in the coordination of its members, promoting the exchange of information, promoting the participation of all actors in the value chains, and managing the incorporation of support organizations that are outside the value chain, such as professional training organizations and productive research and development organizations (Monge-González, Salazar-Xirinachs and Espejo-Campos 2018). The cluster's actions seek to resolve market failures that hinder innovation and productivity, and its initiatives are born from its members based on specific needs (Monge-González 2018).

The cluster as a form of organization can occur spontaneously between private sector actors, without formal agreements, where the responsibility of coordination between the members is

assumed by those who have a specific need that seeks to solve in coordination with others. Currently, it could be said there are several agricultural value chains that are finishing its agglomeration stage and are in the process of creating a cluster. Coffee, sugar, bananas, pineapples, and livestock are value chains where clustering has already begun.

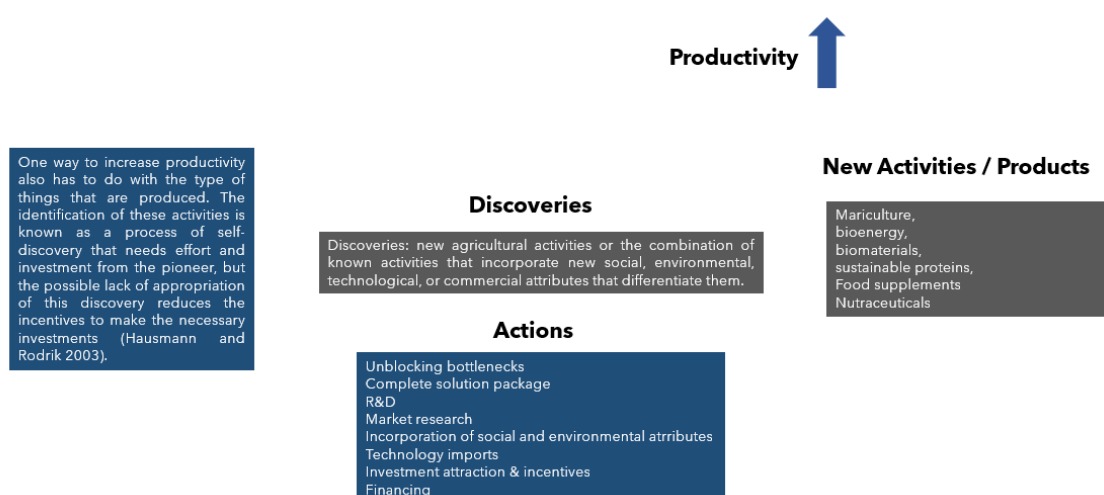
EU firms with interests in seizing opportunities in the Central American agricultural sector could join the clustering efforts in the above-mentioned sectors.

2.4. New agricultural-based export activities.

One way to increase productivity is to consider what is actually being produced. That is, to focus on products where there is a comparative advantage. The identification of these activities is known as a process of self-discovery that needs effort and investment from the pioneer, but the possible lack of appropriation of this discovery reduces the incentives to make the necessary investments (Hausmann and Rodrik 2003). This market failure is common among agricultural markets in Central America (figure 5).

According to recent studies (Arce and Guevara 2019), a slowdown in the diversification engine of Costa Rican agricultural exports has been evident for a decade. Increasingly, exports are concentrated in few products, agri-food companies, and markets. At two moments in its recent history, Costa Rica has implemented programs of this type, precisely for the diversification and growth of its agricultural-based exports. The first was under the leadership of the Coalition of Development Initiatives (CINDE - Costa Rica investment promotion agency) in the late 1980s and early 1990s. The second is the Discoveries (Descubre) Program, executed by the Ministry of Foreign Trade, as a productive development policy with three components: innovating for agricultural-based export activities, investment promotion, and export promotion (Umaña 2019). This program focuses on discoveries: new agricultural activities or the combination of known activities that incorporate new social, environmental, technological, or commercial attributes that differentiate them. Guatemala executed a similar program through the agricultural exporters association (AGEXPORT). Honduras and Nicaragua have followed the same route with smaller scale programs financed by USAID through private sector organizations, FIDE in Honduras and APEN in Nicaragua.

Figure 5. Pioneer's dilemma.



Source: The author, 2021.

To generate new agricultural exports there must be an innovating platform with a continuous search engine, exploring many possibilities for "discoveries". A discovery is a new activity or the combination of known activities that incorporate new social, environmental, technological, or commercial attributes that differentiate it. Once these activities are discovered, they are "packed" and offered "ready to go" for producers and investors to make the decision to undertake. The goal is to have a very large portfolio of discoveries so that the producer and investors can decide what to do under controlled risk scenarios.

One example is the discovery of activities related to fish and shellfish farming. Costa Rica has experience in growing shrimp as well as tilapia in land, where it became the main fresh supplier to the United States market. The country has the technology and the knowledge to cultivate different species in the sea. The country has 500 thousand square kilometers of maritime area, which effectively becomes the new agricultural frontier. Recently, the red snapper became the first commercial discovery of mariculture in Costa Rica. There are many more opportunities to discover to generate competitive and sustainable export activities.

Section 3 deepens the analysis of new sectors for investing and exporting from Central America.

2.5. Investment promotion to rural areas

Producing more and creating more jobs requires investment, but this is not generated spontaneously. The basic factors of production are shared by countries with similar characteristics that compete with Central America. The solution is found in differentiation through the social, environmental, and institutional attributes that make these countries unique. However, the Achilles heel of investment attraction policies continues to be geographic and sectoral concentration and its small impact on the periphery. Factor endowment in metropolitan areas and its business climate are very different from those found in rural areas, especially regarding the workforce and infrastructure. Therefore, the type of companies that settle in the free zones today cannot be expected to establish themselves outside major cities. Specific and differentiated policies are needed to serve agriculture and related industries.

As mentioned before, EU firms could actively look for investment opportunities in Central America.

3. Analysis of sustainable development strategies of priority value chains

3.1. Identification and selection of value chains

To identify the value chains that would be part of this study, namely: tropical fruits, cacao, and coffee we have followed the criteria suggested by Mora (2018) and Monge-González (2018). These criteria are:

1. Experience: Central America has been a historical producer of tropical fruits, coffee, livestock products and tropical roots.
2. Trade potential: Clearly, the region has been successful in the export of coffee, bananas (since the 19th century) and more recently pineapple. Export success denotes a revealed comparative advantage, which is key to the sustainability of production processes. In addition, this criterion implies participation in global value chains with links to multinational companies, with the potential to transfer technology, best practices and attract investment, both from suppliers and competitors.
3. Employment: this is one of the most obvious and important criteria. As noted, unemployment - which is around double digits - is one of the main problems in the region and is closely related to the incidence of poverty in households in the region.
4. Domestic value added in exports: parallel to the generation of employment, the potential for production chains determines the stimulus to the economic activity of the entire region. According to Monge-González (2018), the chosen activities are cataloged as strategic, with important backward and forward linkages.
5. Relative weight in the economy: without discriminating new or incipient products, these three activities represent the bulk of agriculture production in the region. This ensures working with "critical mass" and the mobilization of resources and assets for the development of business promotion and investment attraction.

Regarding the qualitative variables, the following were taken as a basis:

1. Lead firms: part of the recommendations found in Mora (2018) and Monge-González (2018) suggest carrying out an inventory that identifies relatively large companies with the capacity to produce vertical and horizontal linkages, which constitutes them a source of "Traction" for smaller companies that do business with them. These companies are innovative, participate in global value chains, are an important source of employment and help increase the productivity of other smaller companies through the contracting of goods and services. Firms like these operate Central America, especially in bananas, pineapple and coffee as well as in associated services, such as logistics and transportation.
2. Potential towards achieving sustainability through innovation.

3.2. Tropical Fruits

Fruits, mainly bananas and pineapples are very significant to the development of Central America's rural areas, highly influenced by government policies and programs related to agricultural production and exports. Central America's production and exports of these commodities (and export-competent companies in this sector) are mainly concentrated in Costa Rica, Guatemala, Honduras and, to a certain extent, in Panama. Nicaragua and El Salvador may have isolated success cases, but the wider sector is still restricted by productivity and infrastructural issues.

Central America is marked by a strong presence of 4 multinationals (Del Monte, Chiquita, Dole and Fyffes) which are vertically integrated and dominate the production and commercialization for bananas, pineapples and partially for melons. However, there are also independent

producers and SME exporters who are able to take a position in niche markets. Advances in shipping containerization has allowed independent actors to export directly.

There's continuous demand for larger product categories like banana and pineapple, but also increasing opportunities for products such as (Hass) avocado, blueberries, exotics (examples: passion fruit, papaya, granadilla, and dragon fruit), mini-vegetables and leguminous vegetables. Organic assortments also show potential, with examples in passion fruit, citrus, ginger and sweet potatoes. However, Central America has limitations in organic production due to difficulties associated with certification.

European importers are generally interested in fruits from Central America, but concerns related to illegal activities in drug trade and identity fraud are prevalent. In addition, Central American suppliers can only remain competitive on the European market under strict conditions related to quality, low MRLs and certifications. Global GAP is a minimum requirement and an unnegotiable condition for market access. Social certifications like GRASP and SMETA are becoming market entry requirements as well.

The region is the ninth largest fresh fruit exporter worldwide. Although Europe, and especially the Netherlands, is an interesting destination for these countries, the USA still represents the most important channel for Central America's fresh fruit and vegetable exports. One clear exception is Panama, whose exports are mainly directed towards Europe.

The product category "bananas and plantains" is the largest export for 5 out of 6 Central American countries, whereby Costa Rica and Guatemala are the main exporters, followed by Honduras and Panama. For Costa Rica, the category "pineapples, avocados, guavas, mangoes" (dominated by pineapples) is also of great significance in terms of export. This is also an important category for Honduras, Guatemala, and Panama.

The category "melons, watermelons, and papayas" plays an important role in exports from Guatemala Costa Rica, Honduras, and Panama.

Costa Rica is the largest Central American fresh fruit supplier to Europe, accounting for as much as 11% of total European imports of tropical fruit. Costa Rica has an especially relevant role as a supplier of bananas and pineapples, its largest fresh produce and export products within the group of fresh fruit and vegetables. Exports are controlled by transnational companies located in the country: Del Monte, Chiquita, Fyffes, and Dole.

Panama also registered smaller but significant figures in European imports of tropical fruit, reaching a share of 1% of total European imports. Bananas and plantains represent Panama's largest produce within the category of fresh fruit and vegetables, and accounts for 70% of its fresh fruit exports.

Panama also shows a consolidated production of bananas around transnational companies. In addition to the large player Chiriquí Land Company (brand name Chiquita), the National Assembly approved the agreement between the Panamanian state and Banapiña S.A., a subsidiary of Del Monte, which will invest \$100 million in reviving banana production in Chiriquí Grande in Bocas del Toro and in Barú and Alanje in Chiriquí within the next 7 years.

Guatemala has a strong role and is Central America's main supplier to Europe - representing nearly half of the region's supplies) in off-season vegetables, mainly leguminous vegetables. Guatemala has a good reputation among European importers in the categories of leguminous vegetables, niche products like mini-vegetables and other fresh vegetable categories. Guatemala also plays a considerably important role in the category of tropical fruit (mainly bananas).

Within the category of off-season fruit, predominantly melons, Honduras is an important exporter to Europe. Melon exports are represented to a large extent by the Japanese group

Sumitomo Corporation, which took over Fyffes in 2017. Honduras is also a supplier of Asian vegetables (mainly okra) to Europe, explaining its leading position as a supplier of tropical vegetables.

3.2.1. Sustainability

Despite several initiatives in government programs and certifications, the sustainability performance of this sector is still affected by the overuse of agrochemicals and deforestation in certain regions. From the social perspective, child labor and decent work aspects also affect the value chain, even though the private sector is taking actions at national and regional levels to tackle these issues. Fair pricing and land ownership show mixed reports.

The use of agrochemicals in the production of fruits in Central America is still considered a relatively high sustainability risk for the sector. This is especially common in large areas of monoculture, such as in bananas and pineapple plantations (though there are good practices also in these sub-sectors). The incidence in agrochemicals has improved in the last few years due to stricter controls by governments in the use of certain substances, and due to the expansion of implementation of good agricultural practices in Central America - particularly complying with Global GAP.

Similarly, the more widespread implementation of Rainforest Alliance certification in Central America, notably for bananas and pineapples, has addressed issues of overuse/misuse of agrochemicals and contamination of water bodies. Central America is the largest player worldwide when it comes to Rainforest Alliance-certified bananas, mainly relevant for Guatemala, Costa Rica, Honduras, and Panama. For Costa Rica, Rainforest Alliance-certified production of pineapples is also relevant.

Compliance with good agricultural practices and the application of certifications have also brought about delivery of technical assistance to smaller producers, which essentially becomes a necessity for adequate compliance. This is aligned with a trend to revive the agricultural extension systems in Central America, which were halted in the 1990s. This has proven to be a difficult task, due to political and economic factors, but it is key to get knowledge and opportunities to the producers.

Organic production is another (more comprehensive) pathway to address the challenges related to the use of agrochemicals. However, the implementation of organic certification remains limited in Central America. Technical problems lead to high costs, to insufficient market supply, and to reluctance by farmers to accept high risks and greater labor requirements. Even in more developed market such as Costa Rica, extension services for organic certification and management are reportedly limited.

On the one hand, the issue of biodiversity impact is related to the use of agrochemicals, and the situation in Central America is described above. On the other hand, it's also related to the expansion of production areas, and the threat this poses to forest areas, since this is done through deforestation and slash and burn techniques. But not all countries show increase in production areas; for example, Costa Rica hasn't increased its production areas in the last decade.

3.3. Coffee

Coffee is a highly significant sector, and part of the economic and institutional fabric in all 6 Central American countries. The sector involves hundreds of thousands of stakeholders (small, medium-sized, and large) producers and their communities, cooperatives, associations, local traders, processors and exporters; not to mention service providers, technicians, institutional

personnel and other value chain actors. As such, coffee has important impact on rural incomes and livelihoods, and on the general economy of Central American countries.

Following the coffee rust crisis of 2012, the sector is even more present on the agendas of national governments, as well as in the activities of international cooperation agencies present in the region. It has also spurred research and regional cooperation, especially regarding climate change resilience and related subjects such as genetic varieties.

Central American coffee is of great interest to the quality-oriented European market. The region furnishes complex, high-altitude Arabica coffees with multiple social and ecological certifications which matches current European market trends. This is sought after by both regular and specialty coffee buyers, who are active on a market showing stable growth in the long term - but which is marked by diversity and strong competition.

Central American countries also compete for similar coffee markets. Intra-regional trade is limited in the region due to the Central American Treaty on Integration, and this is not an aspect that can change in the short term. The coffee industry is highly institutionalized and regulated, and each country invests highly in promoting and positioning their origins and micro-regions on the international market. However, there are increasing opportunities for regional collaboration. There is potential in intra-regional cooperation by utilizing international trade fairs, and the involvement of regional organizations and platforms in such activities, most importantly PROMECAFE.

Despite its historical weight, coffee has been surpassed by products such as bananas and pineapple, however, it remains one of the most relevant products in the region, mainly due to the recognition of its quality at an international level. Honduras is the most prominent exporter in Central America and the eighth in the world. Its exports in 2019 reached USD \$ 955 million represented 3.3% of world exports. Its main trading partners are Germany, followed by the United States, Belgium, and Italy. As such, coffee is the main export product of Honduras, which a participation of 30.89% total exports, above bananas and pineapple.

Guatemala is the second largest exporter in the Central American region and number 13 worldwide. Its contribution to the total exports of this product was 2.3% and are valued at USD \$ 663 million. Its main trading partners are the United States (38.5%), Japan (13.1%), Canada (10.9%), Belgium (7.4%) and Germany (3.8%). Coffee is the third export product, surpassed by bananas and cardamom. This product contributed 5.9% of total Guatemalan exports of 2019.

Nicaragua is the third largest coffee exporter in Central America and is ranked 18th globally. The main destinations of its coffee exports are the United States (54%), Belgium (7.2%), Germany (7.1%), Italy (3.8%) and Canada (3.6%). In 2019, exports of this product reached a value of USD \$ 460 million, which translates into 1.7% of total coffee exports worldwide. Coffee is the second product exported by Nicaragua, which represented 8.69% of this country's exports in 2019.

Costa Rica ranks fourth in Central America and 23rd worldwide. Its main trading partner is the United States, a country to which it exports an average of 48% of its coffee. Belgium, Germany, and South Korea are the second, third and fourth destinations respectively for Costa Rican coffee exports. In 2019 Costa Rica valued its coffee exports at USD \$ 279 million, which represented 1% of total coffee exports of the world. This is the seventh export product of this country, which contributes 2.41% to its total exports, surpassed by bananas and pineapple.

El Salvador and Panama are ranked 32 and 54 respectively, due to their contribution to world coffee exports. Their contribution does not exceed 1%, however, the value of their exports is important. El Salvador exported a total of USD \$ 111 million in 2019, it is the seventh most exported product by this country, which translates into a 2.3% share of its total exports. Panama, for its part, exported a total of USD \$ 25 million in 2019. It is the country that exports the least coffee in Central America.

Coffee is a major employer in Central America. In Honduras, coffee production is cultivated in 15 of the 18 departments that make up the country, which add up to a total of 300,000 cultivated hectares. Around 20,000 families are registered with the IHCAFE. Of these, 95% are classified as small producers. 85% work individually and 15% are organized through cooperatives. It is estimated that in Honduras 1.1 million people are employed throughout the coffee production chain.

According to data from the National Coffee Association of Guatemala, in this country there are more than 305 thousand hectares planted, which is equivalent to 2.8% of the national territory. This territory is distributed in the 22 departments of the country. On average, this activity generates more than 500,000 jobs.

In Nicaragua, the coffee activity employs more than 332,000 people, this number is equivalent to 15% of the total labor. According to data from the Nicaraguan Ministry of Agriculture, there are 44,519 coffee producers, of which 97% are considered small producers.

In Costa Rica coffee production benefits approximately 38,804 families, who carry out their activities in eight regions of the country that add up to a total of 93,697 hectares, which represents a 1.8% of the Costa Rican territory. Coffee creates more than 150,000 thousand jobs in Costa Rica. In El Salvador, generates around 100,000 direct jobs and up to 400,000 indirect jobs.

3.3.1. Sustainability

In terms of its sustainability risks and opportunities, the coffee sector still presents challenges which halt its development, but which have shown important progress in recent years. An example is child labor, which has received strong attention from several initiatives in Central America involving the private sector. In terms of fair pricing to producers, high level of intermediation still poses a challenge in rewarding producers for their coffee in some countries. The environmental impact of the sector is also negative when it comes to waste management and chemical use; in spite of existing efforts, the sector still has problems in these areas. On the other hand, the high level of shade-grown coffee in Central America mitigates the impact on forest and biodiversity.

Recent years have witnessed important progress in Central America in the development of environmentally sound measures in the management of waste material from coffee: pulp, residual matter, and parchment. This includes composting coffee husks mixed with farm animal manure to use as organic fertilizer in farming practices. Waste management (and re-use) has become an important subject in the technical assistance of different coffee institutes and councils in Central America. However, coffee is still seen as a highly polluting industry in its post-harvest processing phase, since several companies, cooperatives and producers channel their contaminated residual waters to rivers and other waterways.

Central America is known for its shade-grown coffee, which is by far the predominant production method used in the region. Shade-grown coffee production is the next best thing to a natural forest. In this respect, shade-grown coffee offers an environmentally- friendlier alternative to sun-coffee systems. Among different Central American countries there is a higher share of coffee areas grown under shade. In Guatemala and Honduras, for example, 98% of the coffee is shade-grown. As such, this is not a particular sustainability problem for coffee-producing regions in Central America.

The use of pesticides in coffee is generally most common in the production of high- quality varieties in Central America. This is because higher-quality coffees such as Bourbon are more susceptible to coffee rust and other diseases, thus creating a need for inputs to combat such diseases. There is also a correlation between increased nitrogen fertilizer application and the widespread removal of shade cover from Central American coffee plantations, since coffee

agro- forestry systems require fewer chemical inputs. Heavy synthetic fertilizer inputs increase contamination of waterways and aquifers.

In all countries in Central America, the use of chemicals in coffee production remains a similarly significant problem. For example, Nicaragua saw a 15% increase in agrochemical trade in 2016, the year in which plantations were affected by coffee beetle infestation.

There have been important improvements due to the expansion of certification systems in the region (example: UTZ, Rainforest Alliance, Nespresso, Starbucks), which have good agricultural practices components in their standards. In addition, soil management, together with shade-grown techniques, are a crucial aspect in avoiding diseases such as coffee rust. In parallel, these factors decrease the need for chemical inputs such as fungicides.

3.4. Cacao

Cacao production in Central America is low compared to other producing countries worldwide. The collapse of Central America's production began in the early 80s, and it was caused by a mix of diseases (mainly Moniliasis), low international cacao prices, poor yields and government programs with weak scientific support. These aspects were followed by hurricane Mitch that left plantations in disarray in the late 1990s, mainly in Honduras. Revitalization programs in the region, supported by CATIE's Proyecto Cacao Centroamérica (PCC) (2007-2013), helped the recovery of the sector at a time when international prices increased again.

Nicaragua is leading Central America's cacao production, which resulted in 2017 in around 5,000 tons of production. It is estimated that cacao production in Nicaragua will develop towards 8,000 tons in the coming years, mainly because of investments of big private European companies like La Rosita (France), Ritter Sport (Germany), Ingemann (Denmark), Bean & Co. (Israel) and Exportadora Atlantic (part of ECOM Agroindustrial, Switzerland).

For Panama, industry sources adjusted the production estimates to around 500-600 tons. Within the next three years, a growth of at least 8% is foreseen.

El Salvador's production is also expected to pick up due to the efforts of Catholic Relief Services- supported program Alianza Cacao. The program estimates an increase of 1,000 tons in 5 years. Nowadays, domestic demand is met through imports from Guatemala, Honduras and Nicaragua.

Central America is divided in countries producing the quality cacao beans, like Nicaragua and Honduras, and countries that have specialized in the transformation of the beans, like El Salvador Guatemala, Costa Rica (chocolate) and Honduras (for cacao derivatives). They are adding value to production and opening regional and international markets.

3.4.1. Exports

Central America exports cacao in raw form, cacao beans. A development has started of processed cacao export like liquor, butter, powder and chocolate, but these numbers are negligible, and export of these products remains low. Nicaragua is the main exporter of cacao beans, followed by Panama, Honduras and Costa Rica. The other Central American countries show great potential, but there will be limited export quantities for these countries in the near future. Panama, Honduras and Costa Rica show similar export figures and all display growth since 2014. Europe is the main export market for Nicaragua, Panama, and Honduras. Cacao exports from Costa Rica are destined to other Central American countries and to the Netherlands. For Guatemala and El Salvador, the USA is the main destination.

Fine flavored cacao accounts for around 5% of the world's cacao production (200,000 tons per year). The following overview provides the share of total exports of the country classified as

fine and flavor cacao in Central America. Central American countries were defined as exporters of fine flavor cacao (at the indicated share of total exports), and subsequently approved by the International Cocoa Council:

- Costa Rica: 100%
- Guatemala: 50%
- Honduras: 50%
- Nicaragua: 100%
- Panama: 50%
- El Salvador is on the “waiting list” as the production currently is too low. The small amounts produced in the country are of good quality – including Criollo Rojo, a rare native species to the region that is being propagated.

Compared with other suppliers worldwide, Central America accounts for a very small share of total cacao beans imported into Europe. Out of the 2.0 million tons (€ 6.0 billion) of cacao beans traded into Europe in 2016, Central American suppliers accounted for 1,801 tons (€ 6.5 million). This represents less than 1% of total cacao bean supplies to Europe in 2016.

Central American cacao is relatively expensive, even for low grade cacao, due to its regional demand (confectionery industry in El Salvador and Mexico). European buyers are probably not willing to pay premium prices for low or medium quality Central American cacao, or even higher prices for well-processed quality cacao. Substitute countries in West Africa or Ecuador are seen as better options. However, Central American cacao has characteristics that are sought after in the fine flavor chocolate market, since it has a nutty, complex flavor.

3.4.2. Sustainability

Certification: Demand for certification of cacao and chocolate is growing. Even medium quality cacao will need some sort of certification because it has become the standard. In some European market channels (particularly in supermarket chains), certification is becoming a minimum requirement. Certification is an important tool of commitment to sustainability, and usually provide a premium to producers and exporters.

- **Fair Trade cacao:** The main characteristics of this market are direct relationships between buyers and suppliers, a fixed base price that protects producers when world prices fall, and the fair-trade reward. This fair-trade reward supports social investment in development processes of producer communities.
- **Organic cacao:** There is a niche market for organic-certified cacao within the specialty segment. Organic production maintains and improves the health of soils, ecosystems and people. Technical assistance is important in order to be able to produce according to the principles of organic production, including methods for the control of pests, diseases and for the improvement of soil fertility.
- **Other sustainability schemes:** Two leading certifications for cacao in social, environmental, quality aspects and the model for continuous improvement are Rainforest Alliance and UTZ. Cacao plantations that are Rainforest Alliance certified are currently located in Costa Rica. UTZ is known mainly for its certification of coffee products, but it also certifies cacao. In 2017, these two organizations announced a merger into a single organization and certification body named Rainforest Alliance. This organization utilizes the respective strengths of the current Sustainable Agriculture Network (SAN) and UTZ standards, while creating a single auditing process for certificate holders.

Micro lot cacao is the only type that does not need certification as its quality and traceability to farm level is so high that it goes 'beyond certification'.

EU food safety measures: The European Union has strengthened its regulation on cadmium in cacao and derived products. Cadmium is found naturally in the soil, but pesticides and chemical fertilizers containing cadmium are also sources of contamination. The presence of cadmium is a particular problem for cacao from some Latin American countries due to factors like volcanic activity and forest fires; it may also be a market access problem for some areas/producers in Central America.

4. Analysis of the export and investment potential of European companies in priority areas: agrochemicals, seeds, agrotechnology and machinery

4.1. Export opportunities

Central American agriculture is endowed with unique competitive advantages, such as abundant land resources, fertile soil, adequate water resources and favorable climate conditions. However, the inputs that are necessary for agricultural development in the region, which are fertilizers, pesticides, and agricultural machinery, are mostly imported.

The Central American market of agricultural inputs is worth approximately US\$2 billion (around 10% of total market of Latin American and the Caribbean). The growing market in Central America is extremely sensitive to exchange rate influences, making the market value fluctuate depending on political and economic factors. Guatemala and Costa Rica are by far the largest markets in the region representing approximately 60% of the total market value. (See complete set of trade statistics in the annexes).

Major developments in the crop protection market are related to the control of fungus diseases in bananas and the lowering of maximum residue limits (MRL) in the EU. Fusarium in banana has posed a huge threat in the region, which has the potential to wipe out Cavendish banana production as we know it. Gene editing and biotech may offer the solution with a resistant variety, which is being tested in Africa as the disease has not landed in the region. According to exporters interviewed, the removal of maximum residue limits (MRLs) in Europe of key control compounds jeopardize exported oriented agriculture and the well-being of growers, and countries, by disconnecting from the realities of production in Central America in favor of EU public goals.

While the EU is becoming ever more stringent, regulatory overhauls in Central American countries have shown promise. When Costa Rica joined the OECD in May 2021 there was finally a light at the end of its 10- to-12-year backlog of pesticide registrations. After enacting the Mutual Acceptance of Data system allowing it to fast-track registrations that are recognized in other OECD countries, Costa Rica registered its first active ingredient in 12 years, mefentrifluconazole (BASF's Revysol fungicide).

Fertilizers and pesticides account for almost 75% of total imports of these products. The EU plays an important role as a major supplier of certain inputs, including sowing seeds and quality insecticides (Annexes). In these markets, EU exporters face fierce competition from US and Brazilian firms, but more recently to Chinese companies, that are achieving great success in agricultural machinery, fertilizers, and pesticides.

Table 1 summarizes the technical, sustainability and market opportunities for European firms in Central America.

Table 1. Priority value chains: Characteristics and opportunities.

Characteristics and opportunities	Coffee	Tropical Fruits	Cacao	Beef and dairy
Actual size and importance in the economy	Large	Large	Small	Large
Sustainability potential / Alignment with Green Deal, Farm to Fork, Biodiversity Strategy, Reforestation Directive	Very High	Very High	Very High	Very high
Sustainability issues	Water and waste management Overuse of agrochemicals	Overuse of agrochemicals, contamination of water bodies and deforestation	Not significant	Deforestation Water contamination CO2 emissions
Technological opportunities	Coffee rust Processing technology MRLs Water management	Fusarium TR4 Sigatoka MRLs Processing technology Genetics	Cadmium residues MRLs Processing technology Overall productivity	MRLs Feed & additives Animal health Processing technology Genetics
Sustainability opportunities	Climate change adaptation Biodiversity conservation Organic Social and environmental attributes Shade grown	Biodiversity conservation Soil degradation Organic Plastic recycling Packaging Social and environmental attributes Biomaterials	Climate change adaptation Biodiversity conservation Organic Social and environmental attributes Packaging	National Appropriate Mitigation Action. Low carbon livestock / Low emission development strategy.
Market opportunities	Single origin - specialty coffees	Active and healthy lifestyle	Single origin - specialty cacaos and chocolates	Low carbon beef and dairy Chesse and yogurts
Institutional coordination	Very Good	Good	Incipient	Good
EU firms presence	Large	Medium	Large	Small

Among the activities listed in table 1, is clear that tropical fruits, including pineapples and bananas together with coffee compound the lion share of opportunities based on market size. Each of these items need a complete market research study.

5. Descriptive analysis of the recommended market access strategies for European SMEs

5.1. Market Access in Central America

Central America has adopted several regional regulations, including the Central American uniform Customs Code, and the Convention on the Central American Tariff and Customs Regime, as well as Central American regulations on customs valuation, rules of origin, unfair trade practices, safeguard measures, and the standardization of Sanitary and Phytosanitary Measures (SPS) and technical regulations.

Under the Central American Common Market, the region has a common external custom duty, the Central America Import Tariff (ACI), which covers 6 978 items at the 8-digit level, excluding products traded with Panama. In 2015, the CACM countries were still in the process of harmonizing ACI tariff lines; 93.4% of these consignments had been harmonized, and the remaining 6.6% mostly comprise vehicles (2.3%), agricultural products (2.7%) and industrial goods (1.7%). In 2010, CACM members launched the Computerized Central Tariff (AIC), which contains all tax and tax reductions for products entering the CACM. Non-tariff measures - such as technical regulations or SPS measures - are also included in the system.

Central American countries have adopted several customs reforms to facilitate trade in the last decade. Initiatives have been launched to reduce customs controls and facilitate the intra-regional movement of goods by applying a common customs valuation system and risk assessment and introducing the electronic transmission of data. Harmonization of customs procedures has also progressed. In 2007, the Framework Convention for the Establishment of the Customs union was signed. The Convention includes three stages in the customs union process: 1) institutional strengthening, 2) trade facilitation, and 3) regulatory convergence. In the context of this framework, technical regulations for various sectors - food, medicines, and agricultural inputs - have been negotiated and enforced, facilitating the introduction of a sanitary register for authorized products, and the application of SPS measures in a more consistent manner.

5.2. Major market access provision of the EU Central American Association Agreement

The trade pillar of the EU-Central America Association Agreement reduces tariffs and increases the efficiency of customs procedures between regions. The EU-Central America Association Agreement facilitates EU traders to import from, and export to Central America, eliminate most import tariffs and improve access to government procurement and investment markets. Most of all, creates a more predictable environment for trade in Central America, with a mediation mechanism for non-tariff barriers and a bilateral dispute settlement mechanism.

Central America removed tariffs on 67% of its agricultural tariff lines, covering around 62% of agricultural imports from the EU. The EU maintains a market access information system¹ "My Trade Assistant" where exporters can check the current market access regulations to export to Central America. Exports to Central America need to comply with certain rules that prove its origin to qualify for the preferential rate, known as the rules of origin. The rules of origin are set out in Annex II concerning the definition of the concept of 'originating products and methods of administrative cooperation of the EU-Central America Association Agreement. A product originates in the EU or Central America if it is wholly obtained in the EU or Central America, manufactured in the EU or Central America using non-originating materials, provided such materials have been sufficiently worked or processed in compliance with the product specific

¹ <https://trade.ec.europa.eu/access-to-markets/en/content>

rules set out in Appendix 2 of the EU-Central America Association Agreement. Specific rules for originating products can be obtained ad “My trade assistant” platform².

Summing up, to benefit from a preferential tariff, importers must provide proof of origin. The proof of origin can be either a movement certificate EUR.1³ or an origin declaration. No proof of origin is required when the total value of the products does not exceed, €500 for small packages, or €1,200 for personal luggage. The proof of origin is valid for a period of twelve months from the date of issue.

The customs authorities may verify whether a product imported is indeed originating or fulfils other origin requirements. Verification is based on administrative cooperation between customs authorities of the importing and the exporting parties, and checks done by local customs (visits of the importing party to the exporter are not allowed). Once the verification is concluded, the authorities of the exporting party determine the origin and inform the authorities of the importing party of the results.

5.3. Product requirements

5.3.1. Technical rules and requirements

Technical rules define specific characteristics that a product should have, such as design, labelling, marking, packaging, functionality, or performance, and are designed to protect human health, safety and/or the environment. However, it can be costly for traders to comply with different requirements in different markets.

Under the association agreement, the EU and the Central American countries cooperate on market surveillance, drafting technical regulations, setting standards, and establishing conformity assessments. All sides are committed to transparency, making all technical regulations publicly available. Most importantly, the parties strive for the development of harmonized regulations and standards within each region, with a view to facilitating the free movement of goods.

5.3.2. Health and safety requirements (SPS)

Chapter 5 on Sanitary and Phytosanitary Measures (SPS) reaffirms the parties’ rights and obligations under the WTO SPS Agreement, whilst providing WTO - plus procedural measures to promote effective implementation⁴.

The agreement also provides for a Sub-Committee on Sanitary and Phytosanitary to solve any problems that might arise in this area, as well as to track and monitor SPS actions carried out by all parties to this agreement. Further improvements have been agreed, e.g., in the field of animal welfare. These will help build capacity in Central American countries and hence facilitate their market access.

5.3.3. Customs clearance documents and procedures

² <https://trade.ec.europa.eu/access-to-markets/en/content>

³ Certificate of origin applicable in some EU preferential trade arrangements.

⁴ Detailed procedural and interpretive measures are to be found in Annex VII Requirements and provisions for approval of establishments for products of animal origin and in Annex VIII Guidelines for conducting verifications.

The agreement ensures more transparent and simplified customs procedures to facilitate trade and reduce costs for businesses. Depending on the product, the customs authorities may require all or some of the elements below:

- Commercial invoice.
- Packing list.
- Import licenses for certain goods.
- Certificates showing your product complies with mandatory product regulations, such as health and safety requirements, labelling and packaging.
- Proof of origin - origin declaration.

5.3.4. Intellectual Property and Geographical Indications

The EU-Central America Agreement provides for stronger intellectual property rights for exporting to Central America. The agreement confirms the parties' commitments to the TRIPS agreement and the Convention on Biodiversity (CBD) and accords them both national treatment and most favored nation (MFN) treatment. In other words, owners of intellectual property will be treated no less favorably than a country's own nationals or those of any other country.

The Central American countries have amended and adopted new legislation to incorporate regional specialties and Geographical Indications (GIs) in a manner similar to the EU. More than 200 geographical indications, such as champagne, Parma ham and Scotch whisky, are also protected on Central American markets.

5.3.5. Value Added Tax, excise taxes and surcharges

Central American countries impose internal duties such as value-added (sales) on the purchase of most goods and services, as well as excise taxes for many imported and domestic products. In countries like Costa Rica, certain imports are also subject to surcharges. The surcharges are generally paid on goods that are also manufactured in Central America.

5.4. Current and potential opportunities for exports, investment, and the provision of services towards innovation for sustainable development

In sectors - including agriculture and related industries - where the EU and Central American countries have made market access commitments, the parties have agreed not to restrict the establishment of business in any of the following ways:

- Limitations on the number of establishments (whether in the form of numerical quotas, through monopolies or exclusive rights, or by requiring an economic need test).
- Limitations on the total value of transactions or assets that are allowed (either in the form of numerical quotas or by requiring an economic need test).
- Limitations on the total number of operations that are allowed in the country, or limitations on the total quantity of output expressed in terms of designated numerical units (in the form of quotas or by requiring an economic needs test).
- Limitations on the participation of foreign capital in terms of maximum percentage limit on foreign shareholding or the total value of individual or aggregate foreign investment.
- Measures which restrict or require specific types of establishments (subsidiary, branch, representative office) or joint ventures through which an investor of the other party may perform an economic activity.

Furthermore, the agreement enables the entry and temporary stay in the EU and Central American territories of key personnel, graduate trainees, and business services sellers.⁵

Senior business staff who are responsible for setting establishments are allowed to stay in any of the Central American countries that are party to this agreement for ninety days in any 12-month period.

Also, managers and specialists who are transferred from EU-based operations to those in Central America can stay there for up to three years once your business has been established there, and graduate trainees who are transferred from the EU to the establishment in Central America should be granted stays of up to one year.

Moreover, cross-border service providers, will allow to enter and stay for up to 90 days a year, to negotiate the sale of services.

Sectors excluded from liberalization does not include agriculture related industries. El Salvador excludes rural land, which may not be owned by foreign [legal] persons, including a branch of a foreign legal person.

Licensing is not widespread in Central America. Traditionally, foreign companies export to the region or set up manufacturing/assembly operations locally. This can be accomplished independently or through joint venture arrangements. Foreigners may legally own equity and may invest in all areas not expressly reserved for state or government sponsored entities. Foreign corporations may be organized legally in several ways: as branches, joint ventures, wholly owned subsidiaries, or locally incorporated companies.

Companies may decide to invest within established free trade zones (FTZ). The FTZ regime is as a set of incentives and benefits granted by countries to companies making new investments and complying with local requirements and obligations. Each country has a unique FTZ regime. These are not permanent regimes. Limitations have been established regarding the length of the benefits and incentives it grants, as they are intended to promote new investments and not to provide certain companies with unlimited commercial advantages over time. Costa Rica and Panama have the most developed FTZ regimes.

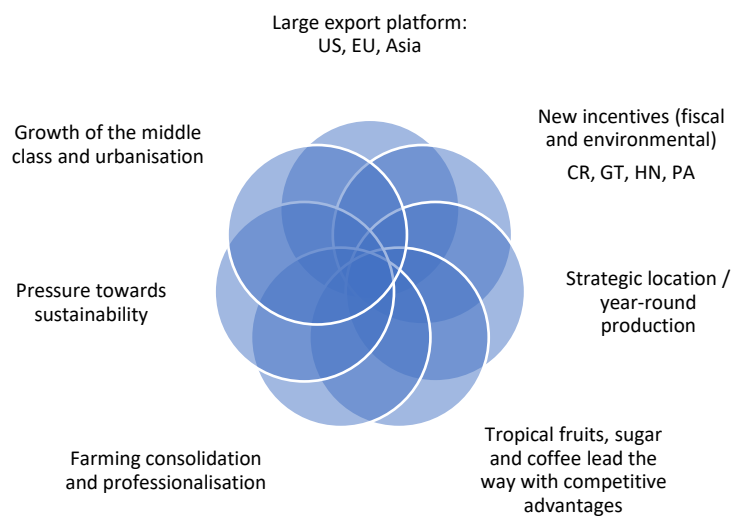
Central America is ripe for investments for sustainable agriculture for the following reasons (figure 6).

1. Growing food demand: According to OECD (2019), Latin America and the Caribbean in the leading region in agriculture exports in the world and will account for 25% of global agricultural and fisheries exports by 2028. This will represent a 22% growth in crops, 16% in livestock and 12% in fisheries. Central America leads the way in bananas and pineapple and has major opportunities in specialty cacao and coffee.
2. Farming consolidation and professionalization: Due to government programs, cooperatives, and the introduction of new accessible technologies. Programs as Descubre in Costa Rica paves the way for international investors in agriculture and related industries.
3. Pressure for Central America to sustainably optimize agricultural production: Consumers are demanding food traceability and security, and international institutions are being stricter towards the region, creating pressure to turn to new agricultural technologies that can sustainably optimize agricultural output. This is particularly true for Central America due to climate change and adverse meteorological events risks. At the same time, authorities of the main exporting

⁵ This is done in accordance with the objective, scope and coverage of the services chapter in the limits of the sectors listed in Annexes X and XI.

- countries are concerned about the impact of changes in European regulations that may affect trade due to changes in the Maximum Residue Limits, MRLs, or the established import tolerances.
4. Growth of the middle class: This growth in the demand for sophisticated and healthy food products presents a great growth opportunity for consumer-focused food companies doing business in the region.
 5. Much room to improve crop production yields: One way to improve food production without causing any harm to the earth is by improving crop yields, which are currently less than half of the yields per hectare of the EU.
 6. Incentives towards foreign direct investment in most Central American countries.
 7. Year-round production.
 8. Export platform to major international markets.

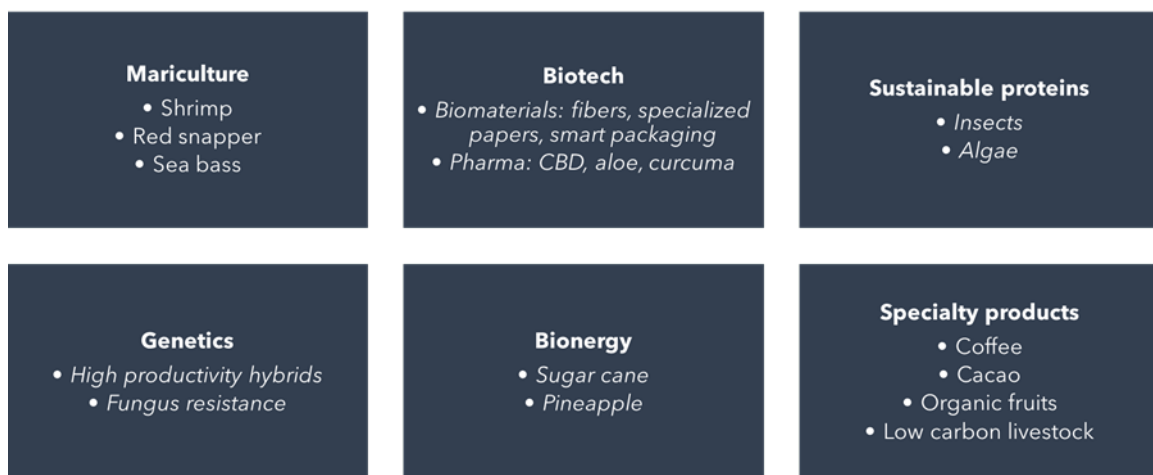
Figure 6. FDI determinants in the Central American Agricultural Market.



As mentioned, market opportunity for the region in agricultural machinery and other inputs is close to \$2 billion. Early mover investors would get an advantage since the number of attractive deals and more mature startups is currently limited.

Based on interviews made, figure 7 illustrates where are the most important sectors for future investment in the region.

Figure 7. Trending sectors for investment.



Mariculture and freshwater aquaculture: Despite the existence of important fishery resources and a considerable potential for mariculture the present annual fish consumption in Central America amounts to about 4 kg per capita, which represents only about 2% of the total consumed protein. Due to a low rating of aquatic organisms among the food preferences that Central America has had in the past, shows a relatively little interest in mariculture. However, a favorable political climate, limited legal restrictions, production incentives, an existing basic infrastructure, and suitable sites for mariculture, especially for the farming of the blue and white shrimp (*Penaeus stylirostris* and *P. vannamei*) and especially spotted snapper (*Lutjanus guttatus*). Spotted rose snapper farms have been established in the Costa Rica Pacific coast with considerably success⁶. Costa Rica promotes the “Discover Mariculture Plan”, an alternative that proposes to take advantage of the cultivation of marine organisms, plants, and animals in the 1,228 kilometers of coastline in the Pacific and Atlantic oceans.

Central America has a long tradition of freshwater aquaculture. Honduras is the main exporter of shrimp prawns, followed by Nicaragua, Panama, Costa Rica, and Nicaragua. There are clear investment opportunities in Guatemala and Honduras at this moment, with favorable natural conditions and good political support. Costa Rica has advanced in the exports of organic shrimp with the support of leading firm from Germany. Rainbow trout, freshwater prawn, snapper, and oysters have diversified aquaculture production in Costa Rica over the last five years. Tilapia is by far the largest species cultivated in the country, with industrial, medium and small-scale producers. Tilapia exports used to dominate the US fresh market, but it now faces stiff competition from China and other Asian exporters. Still, there are several investment opportunities in this industry in which the country is endowed with competitive factors.

Biotech and circular economy: Of particular interest is the biotech sector in Costa Rica. A recent study carried out by the Costa Rican Foreign Trade Promotion Agency (PROCOMER), determined that, in 2018, companies, business ventures and research centers related to this industry generated a total of 6,821 direct jobs. The analysis also revealed that the sector reported approximately \$629 million in revenue, a figure that, compared to the country's GDP, represents the equivalent of 1.05% of the national economy. In 2018, the industry boasted a total of 87 companies or businesses in the country, as well as 42 research centers related to the sector. In addition, 48 of the 87 companies are exporters. At present, of the 87 companies or business ventures whose core line of business is the result of an R&D process in the field of biotechnology, 32 are dedicated to green biotechnology (agricultural, forestry and livestock) and 18 companies deal with biotechnological applications in human or animal health and medicine. The abundance of biomass in all Central American countries suggest the possibility for the establishment of firms interested in the transformation of these materials.

Turmeric (curcuma), cannabis (hemp and medical cannabis) and aloe are examples of products whose industrial production could thrive in Central America. Turmeric and aloe processing firms have established in Costa Rica free trade zones. The chemical Acemannan derived from aloe vera leaves is produced by the Israeli-Costa Rican firm Natural Aloe based on ideal growing conditions, proprietary extraction process and solid pre-clinical and clinical evidence of beneficial properties for skincare applications, food supplements and other medical products.

Very recently Costa Rica enacted a law that allows the production and processing of hemp and medical cannabis in the country, opening the prospects for international investing in these industries.

Of particular importance for the region is the utilization of biomass to produce new materials and waste management and thus contribute to a circular economy. Bananas, coffee, and pineapples produce a lot of biomass. Recent small-scale efforts suggest the potential to

⁶ www.martec.co.cr

convert pineapple plant residues into vegan leather. An Israeli firm, Nova Milan, has invested on an innovation center in Costa Rica. Costa Rica is the largest exporter of pineapple in the world.

Packaging is an area where Central America could take profit of the current shift towards sustainability. The abundance of biomass and the demands of customers make the region an ideal place to develop businesses around sustainable packaging. Currently there are efforts in the region towards the development of new materials for packaging and transporting, including paper pallets, banana leaves, bioplastics, etc.

Coffee wet processing produces chemical residues that are water contaminants. Efforts towards reducing them include several technological advancements led by EU firms. "In the context of the circular economy, waste is perceived as a source for the recovery of high added value compounds and researchers from around the world are actively studying the reuse of coffee waste via physical-chemical or biotechnological routes (e.g., phytotechnology). Sources of bioactive compounds are among the most valued and used for different industries and fields, such as food, pharmaceuticals, or cosmetics" (Campos et al 2021). Coffee washing water also stands out as a supporting manufacturing ingredient, especially regarding its nutraceutical properties, which have been shown to facilitate the insertion of new functional foods based on coffee residues.

Sustainable proteins: All foods made from meat, poultry, seafood, beans and peas, eggs, processed soy products, nuts and seeds are part of the protein food group, which is fundamental to human and animal health. Yet the way they are produced and consumed place a heavy strain on the Earth's land and sea resources. The production of protein is associated with significant social, environmental, and economic impacts – for example, the cultivation of soy as animal feed is a major cause of deforestation, while food and agriculture are among the biggest contributors to climate change.

Six areas of innovation have been recognized to meet future demand sustainably (Protein Challenge 2040). The six areas are: increase the proportion of plant-based protein consumption with consumers; scale up sustainable feed innovation to meet the demand for animal protein; close the protein nutrient loop (for example, reducing waste rich in protein by finding new ways to return it to the production cycle); develop indigenous plants as protein sources for local communities; scale up sustainable aquaculture for food and animal feed; and restore soil health.

Central America with the adequate supply of technology and capital is uniquely positioned to advance the production of sustainable proteins such as algae and insects. Pilot projects are underway in Costa Rica with pioneer firms as Costa Rica Insect Company backed with research by the University of Costa Rica and Leipzig University⁷. ***Pre-Hispanic Mesoamerican cultures used insects as source of proteins. This could be a way to combine history, culture, and innovation to found new investment opportunities.***

Genetics and hybridization research: Adaptation to climate change and tropical plant and animal ecosystems is an area that draws the attention of investors, especially from the European Union and the United States. Currently, the region, especially Guatemala and Costa Rica, is home to various ventures for the genetic improvement and adoption of high yield seeds of cotton, banana, pineapple, cocoa, abaca (*Musa textilis*), maize, sugarcane, coffee, cassava, rice, hemp, and among others. Most high yield horticultural seeds are imported from the EU,

⁷ <http://www.cita.ucr.ac.cr/sites/default/files/TESIS%20Maricruz%20Bermudez.pdf>

with the Netherlands as the leading supplier. Horticultural seeds are evaluated and sometimes improved in the region, as adaptation to tropical conditions is important.

Honduras, Guatemala and El Salvador have signed agreements and resolutions stating that gene-edited organisms that do not fulfill the definition of GMOs should be regulated as conventional. All three countries are actively discussing, harmonizing and deciding on a case-by-case basis how products of gene editing will be regulated.

D&PL a subsidiary of Bayer AG, cultivates GMO cotton seeds in Costa Rica to accelerate the developing process of high-yield cotton. This firm has been investing in Costa Rica since 1991.

Agribio is a 100% Costa Rican company dedicated to agricultural biotechnology. Currently Agribio has an area of 8,400 m² greenhouse area of 1,800 m² laboratory 7 has nursery. It has installed for the production of approximately 15 million plantlets per year. Is the leading company in the production and marketing of banana plantlets in Latin America. Agribio markets directly in the U.S., Central and South America, the Caribbean, Europe, and Africa and also have strategic partners in Ecuador, Peru, El Salvador, Dominican Republic, Africa, Mexico and others. Agribio works with musaceae, pineapples, citrus, ornamentals, roots and tubers and biofuels.

Disagro is a Guatemalan company that specializes in agricultural solutions, including hybridization in rice, bananas, coffee, sugarcane, potatoes, palm oil, and tomatoes. The firm imports, produce, formulates, and distributes agrochemicals and fertilizers from EU origin.

Bionergy: The abundance of sun and biomass in conjunction with a benign climate, favor the establishment of investments to produce sustainable energy. Bioenergy from agro-industrial waste, for thermal applications in the industry and specially by agroindustry sector in processes that require heat. Much research is also required to ensure the supply and logistics of new biomass sources, such as waste from sawmills, from agricultural crops (coffee pruning, pineapple, sugar cane, palm oil, etc.), and livestock farms.

Coffee, cacao, rice, and sugarcane processing benefit significantly from the use of bioenergy. Current technologies could be ramped up to take profit of all potential opportunities and to embrace the concept of circular economy.

Investment in biofuels depends on the policy conditions and investment climate in each Central American country. Traditionally Guatemala and Honduras have been the friendliest nations to energy related projects. Costa Rica is pursuing the enactment of a new law that will provides incentives to firms in rural areas to produce energy from plant waste and other sustainable sources.

It is worth mentioning that through Horizon Europe, beneficiary EU firms and NGOs could potentially support the green and digital transition of Central America, which would effectively be a win-win scenario for both regions.

Specialty products: Moreover, the growth in sustainable agriculture worldwide reflects widespread recognition of the importance of environmental responsibility, ethical treatment of workers, humane treatment of animals, and responsibility to consumers for the delivery of quality products. For Central America to take profit of these opportunities, a portfolio of certification services should be available. EU firms are uniquely positioned to provide these services.

Export oriented sectors to the EU should be the main customers to these services: bananas, pineapples, cacao, and coffee are “the usual suspects”.

5.5. Roadmap for market access of EU SMEs in the Central American agricultural sector

EU firms should consider their own resources, previous export, or business experience abroad, and long-term business strategy before entering the Central American market. European products and services enjoy an excellent reputation in the region, albeit the high quality - price

conception. One of the most common market entry options is finding a local agent or distributor. Other approaches include licensing, franchising, and identifying local partners with market knowledge and contacts.

One way to help European SMEs succeed in Central America's priority sectors related to agriculture, is to develop comprehensive market entry or expansion plans, learn about export- and customs-related requirements, obtain export financing, and identify potential partners, agents, and distributors through business matchmaking programs, trade shows, and trade missions led by EU affiliate business associations. These activities should include one-on-one meetings with pre-screened buyers; potential customers or end-users; experienced professional services providers; and key government officials. With these tools, EU small and medium firms will be better positioned to take advantage of opportunities in Central America.

Also, it should be considered to coordinate the EU response to newly arising sanitary, phytosanitary, and technical barriers to trade, such as identifying and resolving challenges posed by new procedures introduced which tend to be pervasive in Central America. This should be done in cooperation with European chambers of commerce representatives together with the EU Delegation in Central America.

Distribution channels do not vary significantly among food and agricultural products. Some products (for example, fresh fruits and frozen foods and agrochemicals) require technical knowledge regarding handling due to their shelf-life requirements and need for refrigeration. Such facilities are readily available in most urban agglomerations in Central America.

Delays at Customs in clearing goods is quite common and a source of higher costs for importers. The food product distribution chain to supermarkets and smaller stores is well developed. Some of the larger supermarket chains import directly. EU firms must consider the need to adapt packaging and labeling requirements to comply with local regulations and registration processes for most consumer goods.

Although it is possible to export directly to Central American retailers, EU small and medium firms will find it beneficial to work with a local representative and possibly even establish a local sales office. A local representative is critical for those companies wishing to sell to government institutions. Since Central America is relatively small, one representative / distributor is often enough to cover several countries.

Registering is one of the most important aspects to export fertilizers and pesticides. The regulatory process in Central America begins with the registration of the phytosanitary products. The authorities must realize an adequate evaluation of the scientific data and said data must demonstrate the safety and efficacy of the phytosanitary product, and guarantee that when the pesticides are used according to label instructions, they do not represent unacceptable risk for the health and the environment. This evaluation is an essential requirement to grant the sales permit or product registration.

In the registration process of a phytosanitary product, the following three authorities intervene:

- Agriculture: Evaluate the "efficiency", in other words, the product will control the pest for which it was designed.
- Environment: Evaluate the impact that the product may have in superficial and underground water, in the fauna and in the air.
- Health: Evaluate the risk that the product may have for the user or person applying the product and for the food consumer.

It is the responsibility of the authorities of each country to maintain an adequate regulatory framework and evaluation process that ensures the quality and safety of the phytosanitary

products that the farmers use. The responsibility for producers, importers and distributors is to present to the authorities the studies or scientific proof which give support to the safety and efficacy of the product which they pretend to market. Relevant regulations for Central America can be found at SIECA (www.sieca.int)⁸.

⁸ Example: [Reglamento Técnico Centroamericano RTCA 65.03.44:07 Plaguicidas. Plaguicidas de Uso Doméstico y de Uso Profesional. Requisitos de Registro y Procedimiento para Reconocimiento de Registro](#)

6. Recommendations

- Central American agricultural faces substantial challenges: the generation of more and better jobs, the attraction of investment to rural areas, the continuous expansion and diversification of the export supply, changes in markets and consumer preferences, and now clearer than ever, adaptation and mitigation to climate change.
- There are opportunities for EU firms in unlocking the potential of agricultural innovation in Central America to drive socio-economic growth, ensure food and nutrition security, alleviate poverty, and improve resilience to climate change, thereby helping to achieve the Sustainable Development Goals.
- Central America is ripe for investments for sustainable agriculture. Determinants include: Large export platform to US, EU, Asia; new incentives (fiscal and environmental); strategic location / year-round production; comparative advantages in specialty tropical products; consolidation and professionalisation of the ag sector; pressure towards sustainability; urbanization and growth of the middle class.
- Opportunities include direct investing in certain sectors linked to agricultural export platforms. Trending sectors include mariculture, biotech, genetics, specialty products, sustainable proteins and bioenergy.
- One way to help European SMEs succeed in Central America priority sectors related to agriculture, is to develop comprehensive market entry or expansion plans, learn about export- and customs-related requirements, obtain export financing, and identify potential partners, agents, and distributors through business matchmaking programs, trade shows, and trade missions led by EU affiliate business associations.

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8. Annexes

Bilateral trade between European Union (EU 27) and Central America and Panama

Table 2. Fertilizers, bilateral trade between EU and Central America.

Thousand US\$

Product code	Product label	EU exports to CACM+PAN			CACM+PAN's imports from world			EU28's exports to world		
		2018	2019	2020	2018	2019	2020	2018	2019	2020
3105	Mineral or chemical fertilizers containing two or three of the fertilizing elements nitrogen, . . .	21,568	20,143	25,122	328,185	304,656	327,874	3,966,144	4,087,430	4,032,824
3102	Mineral or chemical nitrogenous fertilizers (excluding those in pellet or similar forms, or . . .	10,177	5,548	7,535	348,646	360,704	345,287	5,448,429	5,585,360	5,086,012
3101	Animal or vegetable fertilizers, whether or not mixed together or chemically treated; fertilizers . . .	3,197	2,908	5,312	6,289	6,283	7,461	576,404	618,132	690,005
3104	Mineral or chemical potassic fertilizers (excluding those in tablets or similar forms, or in . . .	249	621	1,179	137,205	137,260	137,015	600,209	593,311	518,046
3103	Mineral or chemical phosphatic fertilizers (excluding those in tablets or similar forms, or . . .	100	70	81	2,490	9,130	1,563	182,245	153,855	121,437

Source: TRADEMAP, 2021.

Table 3. Pesticides: Bilateral trade between EU and Central America 2018-2020.
Thousand US\$

Product code	Product label	European Union (EU 27)'s exports to CACM+PAN			CACM+PAN's imports from world			European Union (EU 27)'s exports to world		
		2018	2019	2020	2018	2019	2020	2018	2019	2020
380892	Fungicides (excluding goods of subheading 3808.50)	21,419	16,439	22,089	168,115	146,296	173,685	4,826,294	4,797,165	4,705,439
380891	Insecticides (excluding goods of subheading 3808.50)	8,222	15,450	13,533	176,258	189,511	224,365	2,614,212	2,801,839	2,954,967
380893	Herbicides, anti-sprouting products and plant-growth regulators (excluding goods of subheading ...)	8,425	7,996	9,303	201,028	173,819	220,856	5,201,933	4,794,692	4,415,737
380894	Disinfectants (excluding goods of subheading 3808.50)	2,645	3,237	4,744	59,275	63,157	119,586	1,313,885	1,335,184	2,360,530
380899	Rodenticides and other plant protection products put up for retail sale or as preparations...	5,368	11,857	4,628	26,006	24,252	31,306	870,444	862,741	1,012,954
380869	Goods of heading 3808, containing alpha-cypermethrin "ISO",	2,056	2,367	2,554	1,718	2,060	1,620	251,491	269,815	349,045

	<i>bendiocarb "ISO", bifenthrin "ISO", ...</i>									
38086 1	Goods of heading 3808, containing alpha-cypermethr in "ISO", bendiocarb "ISO", bifenthrin "ISO", ...	224	125	798	355	750	2,028	46,744	35,903	43,106
38086 2	Goods of heading 3808, containing alpha-cypermethr in "ISO", bendiocarb "ISO", bifenthrin "ISO", ...	0	30	39	568	1,828	2,019	254,382	260,180	270,896
38085 9	Goods of heading 3808 containing one or more of the following substances:alachlor (ISO); aldicarb ...	51	101	13	44,695	39,495	29,953	24,379	16,475	17,955
38085 2	DDT "ISO" "clofenotane "INN", in packings of a net weight content <= 300 g	0	0	0	378	48	114	4,864	5,048	4,731

Source: TRADEMAP, 2021.

Table 4. Agricultural Machinery: Bilateral trade between EU and Central America 2018-2020.

Thousand US\$

Product code	Product label	European Union (EU 27)'s exports to CACM+PAN			CACM+PAN's imports from world			European Union (EU 27)'s exports to world		
		2018	2019	2020	2018	2019	2020	2018	2019	2020
8438	Machinery, not specified or included elsewhere in this chapter, for the industrial preparation . . .	51,586	66,369	35,538	120,176	120,810	91,303	10,320,744	9,860,479	9,130,830
8424	Mechanical appliances, whether or not hand-operated, for projecting, dispersing or spraying . . .	20,264	15,869	20,049	96,939	87,070	109,092	9,185,639	8,548,793	8,623,886
8436	Agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery, incl. germination . . .	14,461	11,476	11,145	43,060	39,432	37,865	4,926,336	4,835,946	4,649,822
8437	Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables; machinery . . .	3,457	3,996	9,284	25,769	17,846	36,273	719,349	645,523	611,341
8429	Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, excavators, . . .	10,712	10,047	7,282	341,549	213,235	163,533	13,434,526	13,632,660	11,818,038
8433	Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers; machines . . .	4,545	2,257	5,454	54,009	40,837	42,982	12,823,009	11,940,562	12,337,951
8432	Agricultural, horticultural or forestry machinery for soil preparation or cultivation (excluding . . .	2,659	1,287	1,944	14,371	10,358	11,234	5,310,468	5,070,582	5,135,276

8435	Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices . . .	596	2,042	1,417	1,390	1,099	1,031	289,899	302,951	253,540
8478	Machinery for preparing or making up tobacco, not specified or included elsewhere in this chapter; . . .	38	514	189	1,676	1,654	1,654	955,547	688,511	554,593

Source: TRADEMAP, 2021.

Table 5. Tractors: Bilateral trade between EU and Central America 2018-2020.

Thousand US\$

Product code	Product label	European Union (EU 27)'s exports to CACM+PAN			CACM+PAN's imports from world			European Union (EU 27)'s exports to world		
		Value in 2018	Value in 2019	Value in 2020	Value in 2018	Value in 2019	Value in 2020	Value in 2018	Value in 2019	Value in 2020
870194	Tractors, of an engine power > 75 kW but <= 130 kW (excl. those of heading 8709, pedestrian-controlled . . .	9,427	2,606	2,068	35,395	14,843	17,113	4,370,746	4,329,177	4,470,682
870193	Tractors, of an engine power > 37 kW but <= 75 kW (excl. those of heading 8709, pedestrian-controlled . . .	2,205	1,250	1,180	15,686	13,034	10,846	1,832,996	1,708,525	1,650,161
870120	Road tractors for semi-trailers	7,521	762	1,081	90,804	85,253	65,417	20,771,211	19,015,706	15,045,245
870192	Tractors, of an engine power > 18 kW but <= 37 kW (excl. those of heading 8709, pedestrian-controlled . . .	38	172	70	1,965	1,957	987	314,106	287,494	320,474
870195	Tractors, of an engine power >	903	1,245	36	10,605	9,516	6,723	3,679,158	3,884,999	3,771,959

	<i>130 kW (excl. those of heading 8709, pedestrian-controlled tractors, ...</i>									
870110	<i>Pedestrian-controlled agricultural tractors and similar tractors for industry (excluding tractor ...</i>	34	13	7	998	650	274	41,926	45,107	48,027
870130	<i>Track-laying tractors (excluding pedestrian-controlled)</i>	0	65	0	18,258	5,895	1,652	318,472	345,328	291,605
870191	<i>Tractors, of an engine power <= 18 kW (excl. those of heading 8709, pedestrian-controlled tractors, ...</i>	144	0	0	5,957	2,246	1,697	190,135	182,956	166,130

Source: TRADEMAP, 2021.

Table 6. Seeds for sowing: Bilateral trade between EU and Central America 2018-2020.

Thousand US\$

Product code	Product label	European Union (EU 27)'s exports to CACM+PAN			CACM+PAN's imports from world			European Union (EU 27)'s exports to world		
		Value in 2018	Value in 2019	Value in 2020	Value in 2018	Value in 2019	Value in 2020	Value in 2018	Value in 2019	Value in 2020
120991	<i>Vegetable seeds, for sowing</i>	22,321	17,991	18,636	31,813	31,274	35,767	2,784,769	2,743,100	3,015,476
120930	<i>Seeds of herbaceous plants cultivated mainly for flowers, for sowing</i>	1,610	5,254	1,700	1,929	2,579	2,475	134,892	176,435	174,662
120999	<i>Seeds, fruits and spores, for sowing (excluding leguminous vegetables and sweetcorn, coffee, ...</i>	1,401	697	560	17,840	22,605	15,175	146,333	147,360	170,051
120921	<i>Alfalfa seed for sowing</i>	498	236	167	58	51	38	75,384	62,173	80,821

120925	Ryegrass "Lolium multiflorum lam., Lolium perenne L." seed, for sowing	0	1	15	468	202	186	225,971	265,550	280,661
120929	Seeds of forage plants for sowing (excluding of cereals and of sugar beet, alfalfa, clover ...)	39	7	13	18,777	11,429	16,608	294,434	314,709	368,647
120923	Fescue seed for sowing	12	5	6	1	36	8	106,823	115,885	112,318
120924	Kentucky blue grass "Poa pratensis L." seed for sowing	0	0	0		3	1	35,979	37,639	40,171
120922	Clover "Trifolium spp" seed, for sowing	0	0	0	4	3	11	80,551	79,129	71,861
120910	Sugar beet seed, for sowing	0	0	0	10	194	5	708,898	567,743	688,893

Source: TRADEMAP, 2021.