



Cocoafair – Ramping up sustainable supply chain and production for chocolate made in Ghana

Case study

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Abstract

This pedagogical case-study aims at stimulating students to analyze the different ways they could organize a smartphone supply chain in order to make it as sustainable as possible. To do so, they have to choose the routes, transport modes, and suppliers of minerals such as gold that can support this objective.

Keywords: Cocoa industry, Sustainable supply chain, Chocolate production, Ghana

Introduction

The cocoa industry, with a growing global market revenue estimated at 12.79 billion USD in 2021 (Statista, 2024a), holds a pivotal position in international trade and is particularly crucial for cocoa beans producing countries. This industry revolves around the production, processing, and distribution of cocoa beans, which are the primary ingredient in chocolate, one of the world's most beloved confections. As a major export commodity, cocoa beans serve as a key source of foreign exchange for countries in the equatorial belt, particularly in West Africa, which is responsible for over 80% of the world's cocoa production (Swiss Platform for Sustainable Cocoa, 2023a). Over the last decade, the total global output of cocoa has risen by approximately 20%, escalating from 4.1 million tons in the 2011/12 season to 4.9 million tons in 2021/22. At present, Europe is the largest consumer of cocoa, accounting for nearly 50% of the global consumption, closely trailed by the Americas and Japan. Additionally, there's a rising demand for cocoa in emerging economies like China, Mexico, Indonesia, Turkey, and India (WWF, 2020) (see figure 1).

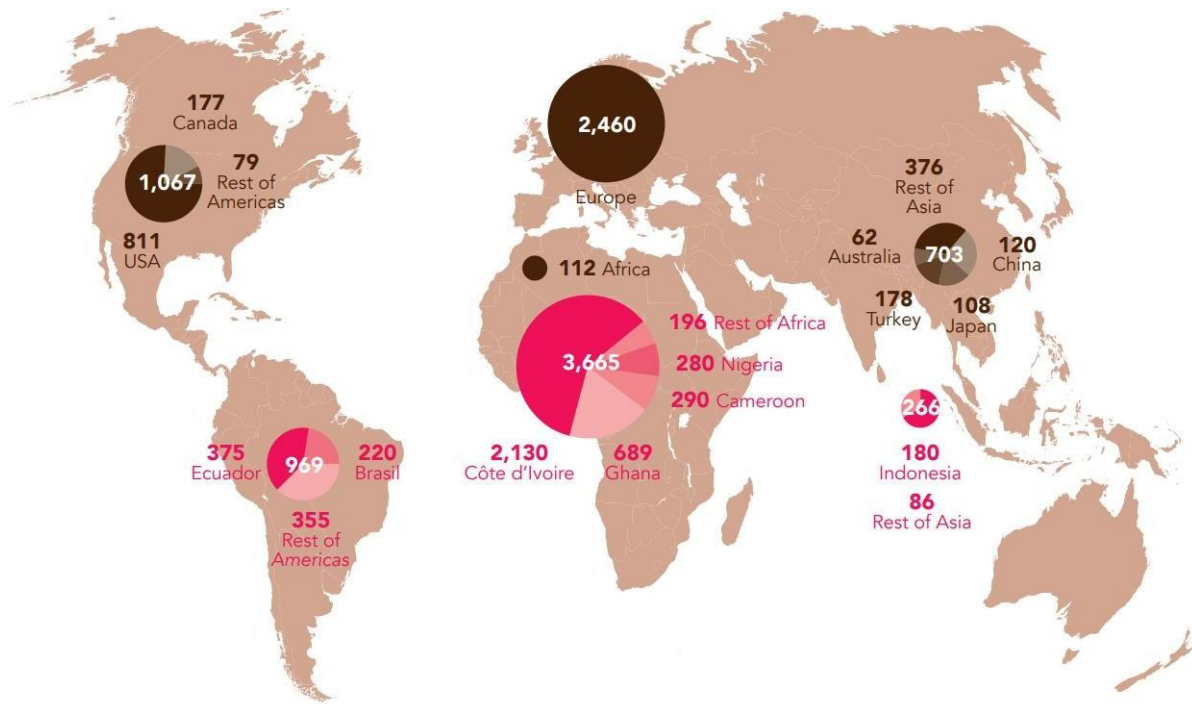


Figure 1 – Production in pink/ Imports in brown of Cocoa in 1,000 tonnes 2020/21 (forecast) (Fountain & Hütz-Adams, 2022).

The current dynamics in the cocoa industry can be best understood under the light of the traditional logistics networks responsible for the transformation of the raw cocoa beans to the end-product (this being mostly chocolate). Similar to other consumer goods, many different actors located in different regions are involved in several activities until the consumer can access the final product. Even though each end-product has its unique logistics network, the main processes relevant for the creation of cocoa products are as follows:

- Cocoa Farming:** Cocoa trees flourish within the tropical regions, specifically between 20° north and south of the equator, thriving in warm and humid conditions. They generally grow under the shade of larger trees. The tree produces cocoa pods, which are harvested twice a year during peak seasons. The harvesting process is manual, involving cutting open the pods to extract the beans. This process is mainly carried on by millions of smallholder farmers who own less than 6 hectares in cocoa producing regions (FAO & BASIC, 2020; Swiss Platform for Sustainable Cocoa, 2023b). The beans undergo fermentation and drying to develop their distinct chocolate flavor and aroma. Together, Côte d'Ivoire and Ghana are predominant in the global cocoa market, accounting for over 60% of the world's supply, which significantly influences the entire industry and makes them heavily reliant on cocoa farming for their economic growth, with the industry supporting millions of small-scale farmers and rural communities (Fountain & Hütz-Adams, 2022).
- Preparing Beans for Export:** Many farmers in producing countries sell their beans to local purchasing stations or agents, who subsequently supply the international cocoa traders. These traders often maintain large storage facilities in coastal regions, where they inspect the quality of the beans and prepare them for export. Alternatively, some organized farmer groups, associations, or cooperatives aggregate their beans to improve their bargaining strength against traders. In certain instances, these collectives directly engage with exporters for the sale of their beans.
- Processing of Cocoa Beans:** A small proportion of the beans are processed in the country of origin; the rest is shipped to processing plants in importing countries. The beans are cleaned, shelled and roasted, and ground into paste. The heat creates cocoa

liquor, which can be further refined into cocoa butter, cocoa cakes (or pulverized into powder) and cocoa mass (solid cocoa liquor), which are sold to chocolate manufacturers (Sociaal-Economische Raad, 2018; Swiss Platform for Sustainable Cocoa, 2023a).

- **End-Product Manufacturing:** Chocolate is produced by blending cocoa mass with ingredients like cocoa butter, sugar, and sometimes milk powder. Additional ingredients like nuts are added depending on the desired flavor profile. Some chocolate manufacturers also handle the roasting and grinding of cocoa beans in-house, before shaping them into chocolate or other cocoa-based products (Swiss Platform for Sustainable Cocoa, 2023a).
- **Retail:** The finished cocoa products are purchased by food retailers, either directly from manufacturers or via wholesalers. Generally, there is an increasing consumer interest in certified cocoa; however, this demand remains lower than the global supply of such certified cocoa. The popularity of various certification labels varies across different consumer markets (Sociaal-Economische Raad, 2018; Swiss Platform for Sustainable Cocoa, 2023a)

These processes are performed by different actors in the logistics networks as shown in figure 2. The actors involved in the processing of cocoa beans are varied both in their numbers as well as in their responsibility within the network. Specially in the case of Côte de l'ivoire and Ghana, the governments play a key role. In the former country, the Conseil du Café-Cacao (CCC) is in charge of stabilizing prices based on forward sales of cocoa, while in the latter, prices for producers and buyers are strictly regulated and all beans must be sold through its central market place controlled by the Ghanaian Cocoa Board (Cocobod) (Sociaal-Economische Raad, 2018).

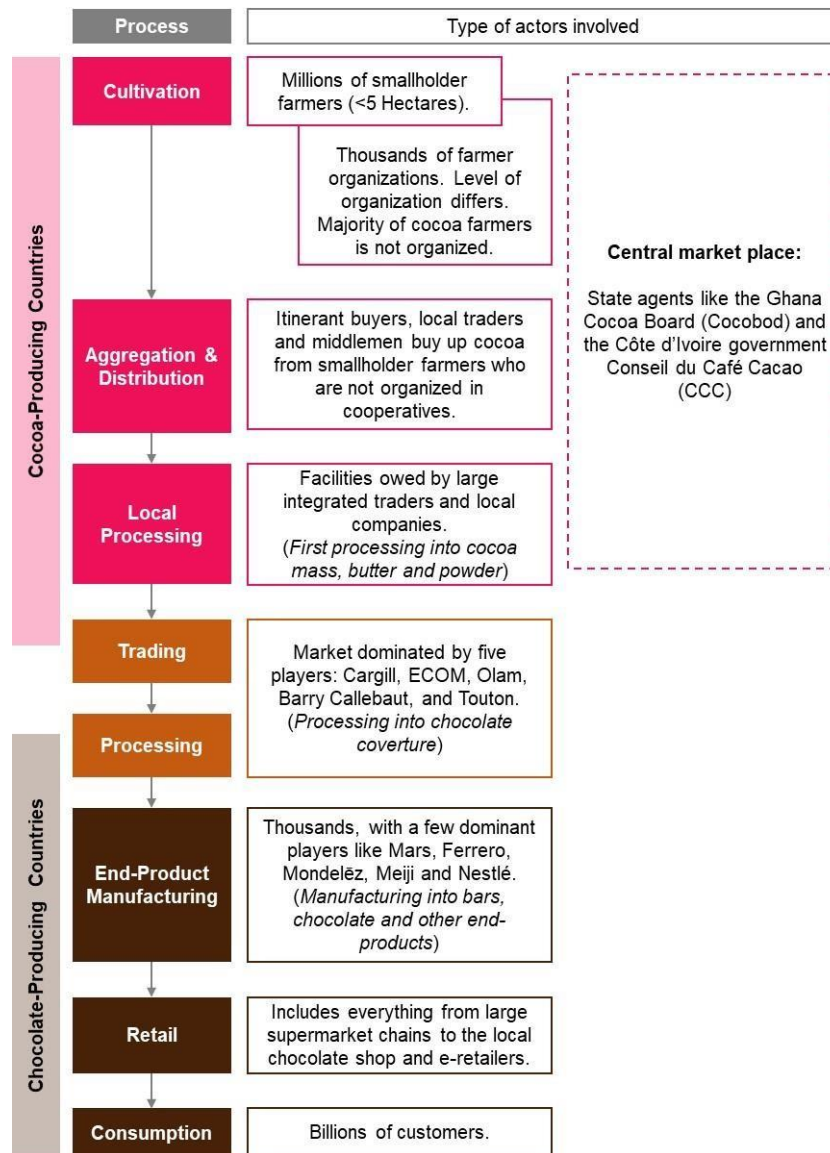


Figure 2 - Logistics network in the cocoa industry and involved actors based on (Sociaal-Economische Raad, 2018).

The logistics network in the cocoa industry is characterized by a heavy asymmetry on the value creation along the cocoa chain (see figure 3). The high level of industrialization and sizeable economies of scale at the end-product manufacturing level have given way for low chocolate prices at consumer level as well as the creation of higher value and margins alone through branding positioning and marketing segmentation. On the other hand, upstream factors such as the country of origin or of first processing have a limited impact, if any, on the value and prices of the end-product. As a result, 70% of the total value and 90% of the total margins generated along the logistics network are earned by the end-product manufacturers and retailers. In contrast, only 18.6% of the total value and less than 7.5% of the total margins remain in the cocoa-producing countries (FAO & BASIC, 2020).

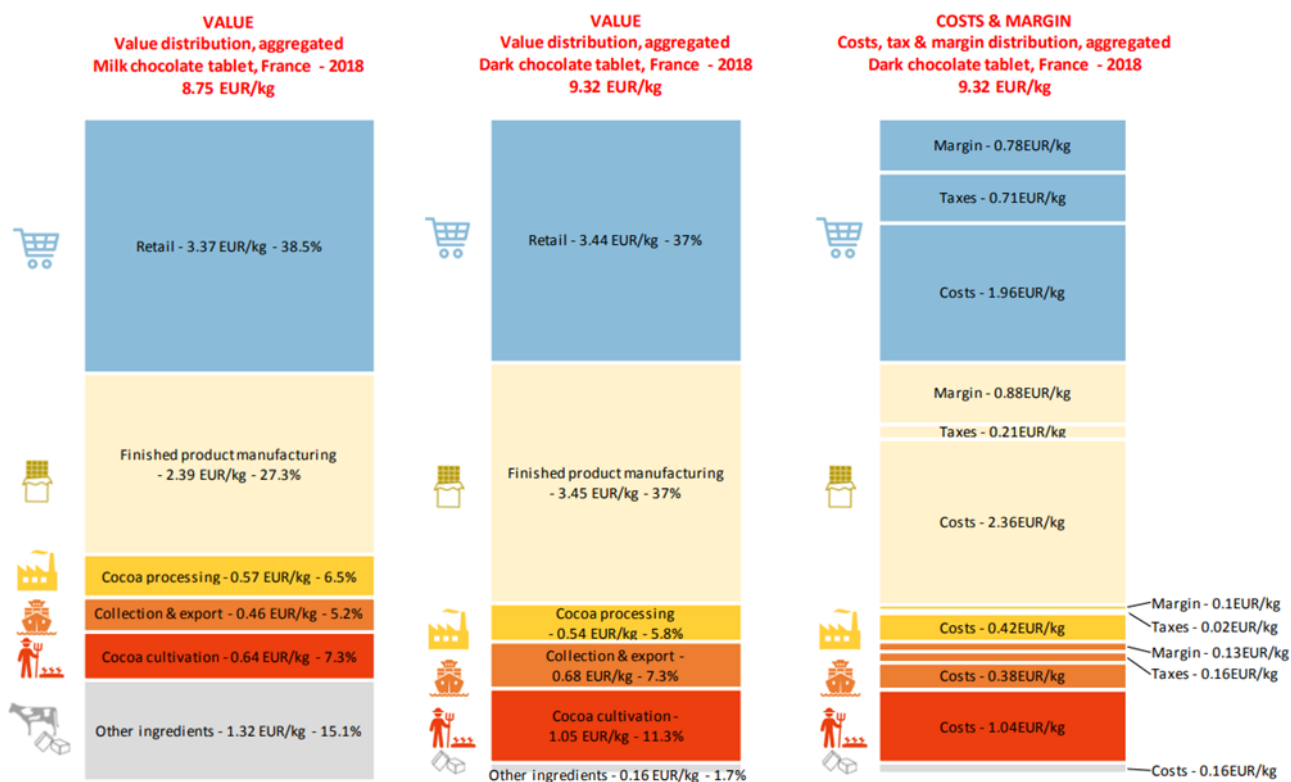


Figure 3 - Value, costs and margin distribution among different actors in the cocoa industry (FAO & BASIC, 2020).

The Ghanaian Cocoa Industry

Ghana is the second largest cocoa producer worldwide with around 20% of the total global cocoa production. The industry plays a major role in the nation's foreign exchange earnings, ranking just behind mineral exports. In 2022, the cocoa industry added 3.13 billion Ghanaian cedis (approx. 262.8 million USD) to the country's GDP and is projected to rise up to 3.75 billion cedis by 2027 (Statista, 2024b). Although the cocoa sector accounts for roughly 3.5% of the GDP, it constitutes about 25% of the total export revenue. Additionally, it represents around two-thirds of the income for cocoa farmers (The Ghana Report, 2022).

With a history of producing cocoa for over a century now, Ghana has a very well-established logistics network structure. Around 90% of cocoa in the country is cultivated and harvested by smallholder farmers in farms not bigger than four hectares. The cocoa production is the primary source of income for these farmer households, accounting for 70% to 100% of their earnings. Additionally, smallholder cocoa farmers support the livelihoods of approximately 4 to 6 million people, which constitutes about 25-30% of the population. These farmers sell their produce (fermented and dry beans) to around 40 to 50 buyers. Moreover, the government established in 1947 the Ghana Cocoa Board (COCOBOD) which still plays a central role in the cocoa trade in Ghana as it has the monopoly on 75% of the cocoabeans' exports (Hess, 2022). This organization operates as a government-controlled institution responsible for overseeing and supporting the country's cocoa industry. COCOBOD's functions are multifaceted, including the regulation of the production, processing, and marketing of cocoa, coffee, and sheanut. It is responsible for setting the buying price of cocoa, which ensures a stable income for the farmers. COCOBOD also undertakes research through its subsidiary, the Cocoa Research Institute of Ghana (CRIG), to enhance cocoa yields and develop better farming practices. Additionally, it provides farmers with subsidized inputs like fertilizers and pesticides and offers training to improve farming techniques. Even though the Ghanaian government has been investing in the improvement of the cocoa industry in the country, it still faces many challenges. For instance, the increase in cocoa production seen in the past years is not the result of improved yields, which are relatively low in Ghana in comparison to other

producing countries (400-450 kg/ha), but rather to the illegal expansion of cultivation areas (FAO & BASIC, 2020). Ghana is experiencing a decline in technical efficiency in its cocoa production, as highlighted by recent studies (Gyan & Bajan, 2023). Crucial factors like natural land productivity and the expansion of farmland play a significant role in the nation's cocoa output. However, challenges are emerging due to a decrease in both the amount and quality of cocoa farmland, negatively impacting productivity. Additionally, Ghanaian cocoa farmers are increasingly struggling to find fertile land, as existing farms are diminishing in fertility. Moreover, the cocoa production in the country is being hampered by the proliferation of Cocoa Swollen Shoot Virus (CSSV), the invasion of gold mining activities into cocoa farming areas, and an economic downturn that renders cocoa cultivation less attractive due to its elevated costs, risks, and reduced profitability (Fountain & Hütz-Adams, 2022). On a last note, continued urbanization in Ghana is likely to increase food demand and prices, potentially leading to a significant shift from cocoa to food crop production, which could alter Ghana's position in the global cocoa industry already threatened by strong cocoa production in Ecuador. Additionally, there's a growing consideration for Ghana to process cocoa beans domestically. Currently, Ghana earns substantial premiums from exporting high-quality raw cocoa beans. However, previous analyses have shown that processing beans within the country could be more profitable than just exporting them in their raw form (Hess, 2022).

Sustainability Issues in the Ghanaian Cocoa Production

Just as is in other cocoa producing countries, the Ghanaian cocoa industry has been facing several challenges concerning its sustainability, especially in the environmental and social aspects. Figure 4 summarizes the main problems in the sustainability of the cocoa industry. Research from the cocoa barometer has shown that not being able to earn a living income, exacerbated by the rising cost of living, remains the main issue in the cocoa production and acts as an enabler for the human rights and environmental protection violations. Furthermore, the research indicates that the current favored strategies for alleviating farmer poverty, such as increasing yields, are insufficient for bridging the income gap. Higher yields do not necessarily translate into higher net income for farmers, but rather bring about increased risks. The report emphasizes that without considerably higher farm gate prices, achieving sustainability in the cocoa sector remains an unrealistic goal (Fountain & Hütz-Adams, 2022).



Figure 4 - Main issues in the cocoa industry based on (Fountain & Hütz-Adams, 2022).

Social Sustainability Issues

Farmers typically earn just about 11% of the final retail price of cocoa, with a significant number of them living below the poverty line (FAO & BASIC, 2020). Many cocoa farmers have small-scale operations which yield limited quantities of cocoa at considerable operating expenses. Coupled with low cocoa prices, farmers often receive inadequate compensation for their primary, if not sole, source of income. Consequently, this economic pressure leads them to adopt unsustainable practices and engage in unethical labor practices, including forced and child labor. In 2019, the cocoa sector in Ghana and Côte d'Ivoire saw over 1.56 million children involved in child labor (WWF, 2020). In fact, Ghana's cocoa supply chain has been identified as a significant contributor to child labor practices. Reports show that children are involved in hazardous tasks such as spraying insecticides, applying fertilizers, and burning brush. While child labor is deeply ingrained in Ghana's socio-cultural fabric, its continued practice is increasingly deemed unacceptable. This shift in perspective is prompting cocoa farmers to consider new approaches to social sustainability (Hess, 2022).

Organic and other sustainability labels like UTZ, Rainforest Alliance, and Fairtrade play a crucial role in guiding consumers and providing social benefits or additional income for farmers. As of 2018, over 3.2 million hectares of cocoa were cultivated under one or more of these Voluntary Sustainability Standards, representing a doubling of the area since 2014. The most significant growth was seen in Fairtrade certified areas, with a 174% increase. In the Swiss market, Fairtrade cocoa and chocolate sales reached around 139 million USD in 2019, showing a 19% rise, although sales slightly declined in other European countries where retailers are adopting their own sustainability schemes over the official Fairtrade standard. However, the Fairtrade market remains substantial (Lazzarini et al., 2020).

Environmental Sustainability Issues

Cocoa farming is a major cause of deforestation globally, with particularly severe impacts in West Africa. Over the last three decades, Ghana has seen a loss of about 65% of its forests, whereas Côte d'Ivoire has experienced an even more drastic reduction, with approximately 90% of its forests disappearing. A significant portion of this loss of tree cover has occurred in the cocoa-producing areas of these nations. The few remaining national forests in these countries are either facing threats or have already been adversely affected, with cocoa cultivation being a primary factor in this environmental degradation. To maintain production in Ghana, farmers are innovating by planting young cocoa trees under older ones and gradually removing the aged trees. This method, while beneficial in the long run, faces the challenge of potential soil nutrient depletion and delayed returns due to the time required for new trees to mature. Moreover, many farmers opt for planting on virgin soil for its higher fertility, inadvertently contributing to deforestation issues. On the other hand, the recycling of cocoa production by-products has been gaining popularity in Ghana as opposed to using agrochemicals such as inorganic fertilizers and hazardous pesticides. Farmers are using cocoa shells as organic fertilizer and converting them into biogas for production needs. This recycling not only helps maintain soil carbon levels but also reduces reliance on synthetic fertilizers and external electricity, with minimal additional labor. Remarkably, the energy potential of these agricultural residues in Ghana is estimated to be equivalent to 13 million barrels of oil (Hess, 2022).

Additionally, climate change has started to affect cocoa cultivations through unpredictable weather patterns and extreme weather events, such as severe droughts and extended periods of rain. These changes affect the overall health and yield of the cocoa trees and makes them more prone to diseases.

Cocoafair: Creating the path towards sustainable chocolate made in Ghana

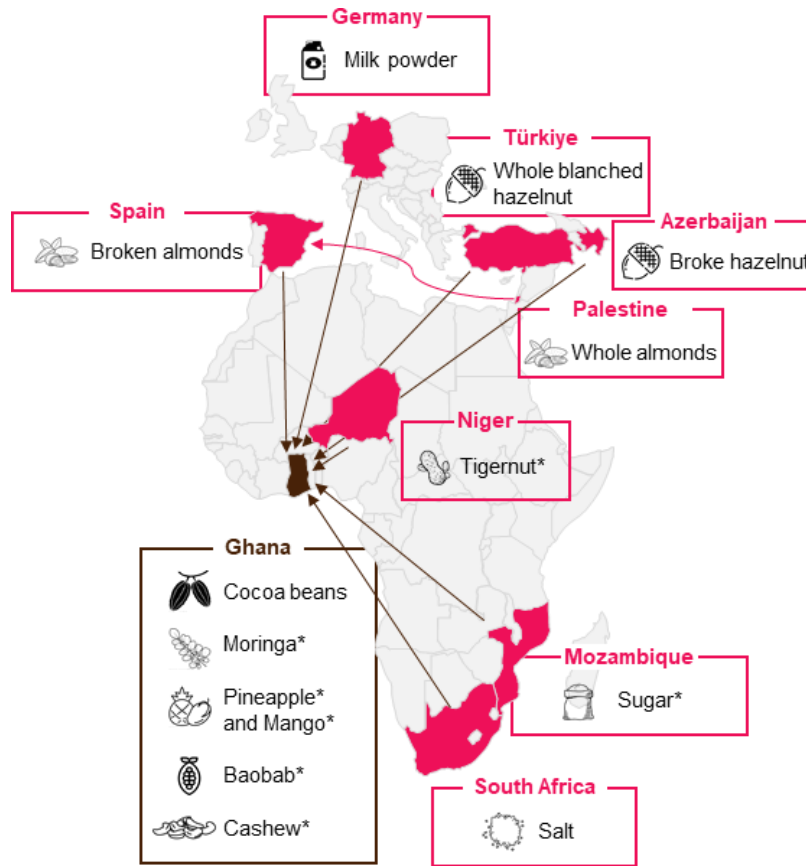
Cocoafair, an innovative company in the chocolate industry, stands out worldwide with its unique approach to sustainable chocolate production. Founded in Germany in 2016 with the mission to revolutionize the traditional chocolate manufacturing process, Cocoafair's core vision is to create a more equitable and sustainable cocoa and chocolate industry. Cocoafair's operations are distinct in that they not only source their cocoa beans from Ghana but also carry out the entire chocolate production process locally. Supported by a number of investors, Cocoafair was able to set-up the first solar-powered chocolate factory in Africa. This approach significantly deviates from traditional methods where the production primarily happens in industrialized countries. By producing chocolate directly in the region where cocoa is grown, Cocoafair aims to keep more of the value chain within the local economies. This model ensures that a greater share of the profits from chocolate production remains in the African countries, directly benefiting the local communities and workers.

Cocoafair's factory is located in a town close to Accra, Ghana, and began operations in 2020 after only 6 months of construction with the support of the Ghanaian government. With a production capacity of 10,000 bars an hour, the company has created 80 direct jobs and 1,500 others indirectly through its linkages to a local farming cooperative. Within the first year of operation, Cocoafair exported 2 million chocolate bars to Europe.

Logistics Network Structure

In order to understand the true impact of Cocoafair in the cocoa industry and the Ghanaian economy, an analysis of its logistics network structure is fundamental. The main ingredient of chocolate, cocoa beans, is sourced from a local farming cooperative and primarily processed in Ghana. Additional ingredients like milk, sugar, and nuts are essential to attain the desired quality of chocolate and meet the customer requirements. Cocoafair sources most of its raw

materials from African countries (figure5). Apart from the cocoa beans, moringa, pineapples, mango, cashew, and baobab powder are sourced directly in Ghana. Tigernut, sugar, and salt are sourced from Niger, Mozambique and South Africa respectively. Milk powder has to be imported from Germany while hazelnuts come from Türkiye or Azerbaijan, depending on their composition. Lastly, whole almonds are sourced from Palestine and broken in Spain before they reach the factory in Suhum. The finished chocolate bars are exported to Europe, mainly Germany, France, Austria and Belgium.



*Organic products

Figure 5 - Supply chain structure of CocoaFair.

Sustainability Impact

CocoaFair’s commitment to sustainability extends beyond economic aspects. The company also focuses on environmental sustainability by adopting practices that minimize their ecological footprint, and social sustainability through fair labor practices and contributing to community development. By doing this, the company is advancing the United Nations’ Sustainable Development Goals (SDG), specially SDG 8 – Decent jobs and economic growth, SDG 7 – Affordable and clean energy, as well as SDG 13 – Climate action.

On the environmental side of sustainability, CocoaFair has notably invested on four key areas to minimize the impact of their operations on the environment:

- i. The roof of the factory is covered with 578 solar panels which generate an average of 16,500,25 KWh/month.
- ii. Instead of using aluminum foil, the packaging of the chocolate bar is made from NatureFlex, a biodegradable material made from wood pulp, and paper. Both

- packaging materials are being sourced from sustainable forests.
- iii. Collaboration with nature office to mitigate its environmental impact, focusing on areas such as operational resources, the transportation of chocolate, business travel, and the use of materials and packaging. In 2021 this partnership successfully offset a total of 300 tons of CO₂ emissions. Additionally, Cocofair has contributed to several carbon offsetting initiatives, including Project Togo, dedicated to reforesting natural forests in Togo, and the Toyola clean cookstoves project. The latter involves providing Ghanaian households with Toyola Coalpots, efficient stoves that can cut fuel usage by approximately 30%.
 - iv. Embracing the zero-waste movement. The company offers chocolate in bulk, typically in 5 kg quantities, which are delivered to zero-waste stores. Here, customers can purchase the chocolate directly, thereby avoiding the packaging materials that typically accompany standard chocolate bars. This initiative aligns with an environmentally conscious approach, reducing packaging waste and meeting consumer demand for more sustainable options.

On the social side of sustainability, Cocofair has positively impacted the Ghanaian and African economy by creating direct and indirect jobs in the continent, both through the production of chocolate in Ghana but also through sourcing its main raw materials from other African countries. Normally, companies with a fair-trade certification would use their premium on community development, such as local infrastructure, healthcare and social projects. Instead, Cocofair gives onethis premium, 600 USD per ton of cocoa, directly to the farmers, while paying at least four times the minimum wage, offering healthcare, subsidized food, and providing free commute for its workers. This approach to value addition is feasible only if the producer can generate and share additional branding revenues with the farmers. Moreover, Cocofair has taken an innovative step by making cocoa farmers stakeholders in the company. Through the Cocofair Foundation, farmers receive dividends from the company's shares, proportionate to the volume of cocoa beans they supply for chocolate production. With this approach, the company ensures that 43% of the total value added of the final product remains in Ghana and around 13% of the value creation stays with the cocoa farmers and the cooperative, as opposed to the 6% from the traditional chocolate production. Furthermore, Cocofair has set the Chocolaterie School of Adesua in Ghana to train and employ young people in creating fine praline specialties from local ingredients on site. This is especially relevant since it helps create more well-qualified jobs in the country and prevents the acute urbanization taking place in many African countries.

Main Opportunities and Challenges of Cocofair in the Cocoa Industry

The company's commitment to sustainability and ethical practices, including fair wages, investing in local communities and environmental stewardship, offers them a unique positioning within the chocolate retail market as the customer base prioritizing these values has been growing over the past years. These customers are not only fairly loyal to their brands of choice but are also willing to pay a premium for organic and/or certified products. Furthermore, Cocofair builds upon their trademark "Chocolate made in Africa" to differentiate themselves on the international market and to create recognition in the African market and expand their customer base in doing so.

Even though the opportunities arising from the production of sustainable chocolate are considerable, Cocofair has been facing some hardships in its operations. Firstly, logistical complexities arise from operating in Africa, where infrastructure may not be as developed as in industrialized countries, posing difficulties in sourcing and distribution (Straube et al., 2022). Entering a market dominated by large, established brands is a significant hurdle, requiring substantial efforts in marketing and brand building. Scaling up production to meet increasing demand while maintaining high quality and ethical standards presents another

challenge. For instance, their factory can achieve the production of 10,000 bars per hour, however, their current output is estimated at 40,000 bars per day. Moreover, building consumer awareness in a competitive market, especially against traditional chocolate brands, necessitates strategic and continuous marketing efforts. The company's operations and profitability are sensitive to fluctuations in global cocoa prices, particularly as CocoaFair pays a premium for its raw materials. Maintaining consistent quality can be challenging when dealing with natural products like cocoa, especially as production volumes increase. Additionally, meeting and adhering to various certification standards (organic, fair trade) can be resource-intensive. In the words of CocoaFair's managing director: "For a product to be truly organic there should be a system that monitors the entire farming process, which should also be supported by a third-party assurance and certification. This is something that is missing on the [African] continent".

Lastly, the impact of climate change on agriculture poses a significant risk, as it can affect both the yield and quality of cocoa, a crucial ingredient for CocoaFair's products. These challenges require

careful navigation and strategic planning for CocoaFair to successfully grow and sustain its presence in the chocolate industry.

In summary, CocoaFair's innovative approach and commitment to sustainability and local production provide distinct advantages in the growing market for ethical and sustainable products. However, the company must navigate logistical, competitive, and environmental challenges to establish and grow its presence in the global cocoa industry.

Guiding Questions

1. Please do a critical analysis of sustainability labels for cocoa. How do their evaluation criteria differ and what implications does this have when dealing with these labels? Please consider the implications from the perspective of a cocoa buyer within the supply chain on the one hand and from the perspective of an end customer on the other.
2. How can digital technologies assist in overcoming current sustainability issues in cocoa supply chains? Please dive deeper into existing solution approaches and provide a market overview.
3. How would you define the logistics strategy of CocoaFair. What are the goal parameters according to which they are optimizing their supply chain? What logistics challenges do you see when trying to reach those goals and what would you recommend CocoaFair how to overcome those challenges?

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