Contemporary global production and consumption of cocoa: an assessment

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Abstract. The paper is dedicated to an analysis of the production of cocoa, which is a critical component for many sectors of the economy. Scientists on a regular basis identify new valuable properties of cocoa, and the scope of its application expands accordingly. Since the 1960s, the global production of cocoa beans has grown fivefold. The key areas of production of the crop include Africa, America, Asia and Oceania. The three countries that in 2019 accounted for almost 60% of the production were Ghana, Cote d'Ivoire and Nigeria. In 2019, the volume of the world market for cocoa and its derivatives exceeded $50 billion. Most of the produce is imported by the USA, UK, Netherlands and France. Prior to the beginning of COVID-19, it was forecasted that in 2020-2024 the market for cocoa and its derivatives would grow by an average of 5% per annum. The pandemic has dampened such expectations as productions chains have been disrupted. In Europe and America, the demand has fallen, but recent forecasts are more optimistic. Nonetheless, specialists disagree on the prospects of the industry. While some note great challenges that the industry faces, others count on the introduction of new technologies to kick-start the sector.

1. Introduction
Cocoa is the commodity that is made of cocoa beans, which is widely used in various fields of human activity due to a variety of beneficial properties.

The main types of primary products obtained from cocoa beans include cocoa butter and cocoa powder. Due to the large amount of antioxidants, cocoa butter is beneficial for the skin and hair, so it is used as an active ingredient in various cosmetics, where it may be added to the composition of perfumes and pharmaceuticals [1]. Cocoa powder is mainly used in the food industry. The areas of application of cocoa and its derivatives are presented in more detail in table 1.

| Food industry | Confectionery industry | Dairy industry | Bakery industry | Distillery and wine industry |
|---------------|------------------------|----------------|-----------------|----------------------------|
|               | cocoa drink, slab chocolate, sweets, toffee, caramel, lollipops, brittle, meringues, etc. | yoghurts, ice cream, chocolate milk, chocolate butter and other dairy products | used as a flavouring and colouring agent for baking | Additives for the production of brandy, gin, wine, vinegar |
|               |                        |                | Production of feed for pets and livestock |                                |

Table 1. Areas of application of cocoa.
2. World cocoa production

The history of the cultivation of cocoa trees supposedly began in the Americas during the time of the Mayan Indians, which were probably the first people to grow cocoa beans. Initially, cocoa grew only in the evergreen rainforests of the Amazon, but gradually spread to almost all countries of the subequatorial belt.

Chocolate, made from cocoa beans, for a long time was a drink of monarchs and the wealthy. In the middle of the 18th century, it became cheaper and more accessible thanks to the expansion of plantations and the mechanization of production. The invention of the cocoa butter press in 1828 improved the quality of chocolate and made it even more affordable. Since that time, cocoa products have been produced in various forms, and not just in the form of a drink [2].

The world population was increasing; the industrial revolution and the expanding use of cocoa products made it possible to increase their production and processing. Production grew steadily (see figure 1).

![Figure 1](image.png)

**Figure 1.** Dynamics of world production of cocoa, thousand tons [3].

Over the years more and more attention has been paid to the cultivation of cocoa. In the 19th century, Venezuela became the leader in the production of cocoa beans. However, in the 20th and 21st centuries the most intensive cultivation of cocoa was observed in Africa. Over the past 60 years, cocoa bean production has increased 4.5 times in Africa, 3 times in America, and 22 times in Asia and Oceania. Whilst in 1961 a little more than 1 thousand tons of cocoa beans were produced globally, by 2019 the volume of their cultivation increased to 5.5 million tons, i.e., more than fivefold. Since 1961, Africa has been the undisputed leader in world production of cocoa beans; its share in 2019 accounted for 67% of world cocoa production. The top ten largest producers that year included Cote d'Ivoire, Ghana, Indonesia, Nigeria, Ecuador, Cameroon, Brazil, Peru, Colombia and the Dominican Republic. Cocoa is also grown in Cameroon, Togo, Sierra Leone and many other countries, but the production figures there look much more modest: they account for only 7% of the world's cocoa bean production.
Cocoa does not grow throughout the African continent. The top five cocoa producers include 3 West African countries: Cote d'Ivoire, Ghana and Nigeria, where conditions for growing cocoa trees are most suitable. In 2019, almost 60% of global cocoa production came from these countries. The leader in the production of cocoa in the world is Cote d'Ivoire, which cultivates almost 40% of all cocoa beans [3].

Since 1961, there has been some change in Africa's leaders in this area. Figure 3 demonstrates how the share of Côte d'Ivoire, which has remained an agricultural country to this day, increased, while the share of Nigeria, where the economy has increasingly been focused on the extractive industry, decreased.

3. World cocoa production
There are many cocoa products on the cocoa market, including unprocessed cocoa beans, cocoa butter, cocoa powder, as well as chocolates, candies, ready-made confectionery and other products. In 2019, cocoa and cocoa products were ranked 53rd among the world's best-selling commodities.

In recent decades, the consumption of chocolate in the world has increased, in particular due to dark (bitter) chocolate, which has become very popular compared to regular milk chocolate due to the high
concentration of cocoa and beneficial effects on human health, especially in terms of strengthening the immune system.

In 2018–2019, the export of cocoa-containing products increased by 2.12% (table 2), the total volume of trade in cocoa and its derivatives amounted to $50.9 billion, which constituted 0.28% of the total volume of world trade [4].

In 2019, the largest exporters of cocoa and cocoa products in the market were Germany ($6.18 billion), the Netherlands ($5.22 billion), Cote d'Ivoire ($4.95 billion), Belgium ($3.89 billion) and Ghana ($2.71 billion) [5].

The history of cocoa in Europe began in 1528, when the conquistador Hernan Cortes brought samples of beans to King Charles of Spain, praising the tonic drink made from "brown gold". Today Europe is the world's largest market for producers, consumers and exporters of cocoa and cocoa products. It is very diverse, as European companies purchase cocoa beans of various origins and qualities to meet the strong demand from the diversified cocoa processing industry.

In 2019, the total volume of imports of cocoa beans, which serve as the main raw material for the production of all cocoa-containing products, to Europe alone amounted to almost 2.5 million tons. In 2015-2019, the volume of these imports grew by an average of 6.4% per year. More than 80% of cocoa beans (worth more than $4 billion) were delivered directly from the producing countries [6].

In 2019, the largest importers of cocoa and cocoa products were Germany ($5.16 billion), the United States ($5.13 billion), the Netherlands ($4.7 billion), France ($3.35 billion) and the United Kingdom ($2.76 billion). The top ten countries-importers of cocoa products are shown in figure 3.

Table 2. Characteristics of the global cocoa market, 2018–2019.

| Product                              | The volume of global trade, USD billion | Largest exporter        | The value of export, USD billion | Largest importer | The value of import, USD billion |
|--------------------------------------|-----------------------------------------|-------------------------|---------------------------------|-----------------|---------------------------------|
| Cocoa and cocoa products, total, incl.| 50.9                                    | Germany                 | 6.24                           | USA             | 5.13                            |
| Cocoa beans                          | 9.56                                    | Cote d'Ivoire           | 3.84                           | Netherlands     | 2.2                             |
| Cocoa butter                         | 5.88                                    | Netherlands             | 1.58                           | Germany         | 0.932                           |
| Cocoa powder                         | 2.36                                    | Netherlands             | 0.696                          | USA             | 0.269                           |
| Chocolate bars                       | 5.16                                    | Germany                 | 1.42                           | USA             | 0.541                           |
| Other cocoa-containing foods         | 4.96                                    | Belgium                 | 1.36                           | USA             | 0.851                           |
| Cocoa products, not included in other categories | 14.4 | Germany | 2.23 | USA | 1.23 |
| Other confectionery products containing cocoa | 8.6 | Singapore | 1.04 | Netherlands | 0.651 |

The countries with the highest import duties on cocoa and cocoa products are Austria (97.7%), Bulgaria (44%), South Korea (38.3%), Cyprus (37.1%) and Iran (37.1%). The countries with the lowest tariffs (0%) are Hong Kong, Mauritius, Norway, Singapore and Switzerland.

Research is constantly being carried out in the world to identify and confirm the beneficial properties of cocoa products, and this leads to an expansion of the scope of application of cocoa and an increase in the demand for it. For example, a recent medical discovery was that regular consumption of cocoa products can have a number of positive effects on the cardiovascular system [7]. Cocoa ingredients have significant antidiabetic potential. Chocolate combines some organoleptic characteristics with the properties of an antidepressant, which enables its application in the course of the treatment of diseases of the psychological and psychiatric nature [8]. Further research is needed to investigate the mechanisms...
of cocoa's therapeutic action in order to support its use as an adjuvant in the prevention and treatment of various diseases [9].

![Figure 4. The structure of imports of cocoa products in the world, %.

4. Conclusions
Before the COVID-19 pandemic, it was expected that in 2020-2024 the market would grow by an average of 5% per year. However, already in the first half of 2020, COVID-19 disrupted the cocoa value chain [10]. Due to interruptions in the supply of raw materials due to the introduction of measures to contain coronavirus infection such as border closures and movement restrictions, as well as due to the closure of specialty stores and other distribution channels, sales of chocolate and confectionery fell substantially. In addition, the demand for cocoa products in Europe and America, their main consumers, has noticeably changed. However, experts from the Center for the Promotion of Imports (CBI) predict that the long-term market prospects, despite the pandemic, are still good in Europe and America [11].

As for the prospects for the development of the cocoa industry in the main producing countries, the opinions of experts differ in this matter. Some fear the many challenges that the industry faces. First of all, these include adverse economic conditions in key producing countries. The complexity of the technologies for growing cocoa, the lack of high-quality seedlings of "chocolate trees", poverty and old
age of the majority of farmers, an excessive number of intermediaries between producers and end consumers, and the lack of commercial information are among other significant negative factors [12].

The International Cocoa Organization (ICCO), an intergovernmental structure created in 1973 under the auspices of the United Nations and which functions according to international cocoa agreements, is working to eliminate information gaps in the industry. ICCO aims at achieving the goals set in the Global Cocoa Agenda. It prepares proposals to promote sustainable production, trade and use of cocoa, and develops conditions and frameworks to stimulate the consumption of cocoa products. In particular, it examines and discusses issues of strengthening the position of farmers that grow cocoa and attempts to forecast long-term structural changes in supply and demand.

Many experts, even taking into account all the existing problems, are more optimistic and expect that the introduction of new technologies will help the sustainable development of the cocoa industry in key producing countries.

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