

**MINISTRY OF AGRICULTURE
THE REPUBLIC OF INDONESIA**

**THE STUDY
ON
THE IMPROVEMENT OF FARMERS' INCOME:
AGRICULTURAL PROCESSING AND
RURAL MICROFINANCE
IN
INDONESIA**

FINAL REPORT

MAIN REPORT

(South Sulawesi Component: Study on Cocoa Sector)

July 2007

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.

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MAIN REPORT (Indonesian)


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MAIN REPORT

MAIN REPORT (Indonesian)



SURVEY SITE



DIVISION OF
REGIONAL DEVELOPMENT
UNIVERSITY OF HASANUDDIN

Legend		Survey Site	
Provincial Borders	District Borders	Kelurahan Tohyaman	Desa Kassa
Sub District Borders	Provincial Road		
Coastal Line	Local Road		
River			

Location Map

The Study on The Improvement of Farmers' Income:
Agricultural Processing and Rural Microfinance in Indonesia
Final Report Main Report
(South Sulawesi Component : Study on Cocoa Sector)

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Attachment

Attachment-1 TECHNICAL ANNEX

List of Terms & Abbreviations

ACIAR	Australian Center for International Agricultural Research
AIKI	Indonesian Cocoa Industry Association
AMARTA	Agribusiness Market and Support Activity
APIKCI	Cocoa and Chocolate Association
APKAI	Cocoa Farmers Association
ASEAN	Association of Southeast Asian Nations
ASKINDO	Indonesian Cocoa Traders Association
BI	Bank Indonesia
BIPP	Agricultural Extension Information Center
BDS	Business Development Service (provider)
BMT	Bank Muamalats
BPP	Sub-District office of BIPP
BRI	Bank Rakyat Indonesia
BTPT	Agricultural Technology Assessment Center
CPB	Cocoa Pod Borer
CSP	Cocoa Sustainability Partnership
CVM	Cocoa Village Model
DISPERINDAG	Local Department of Industry and Trade (SME and Cooperative)
DISUBUN	Local Department of Estate Crops
DOA	Department of Agriculture
DOF	Department of Finance
EHP	Early Harvest Program
FAO	Food and Agriculture Organization of United Nations
FAQ	Free Air Quality / Fair and Average Quality
FEATI	Farmer Empowerment through Agricultural Technology and Information (for Eastern Indonesia)
FOB	Free on Board
FTA	Free Trade Agreement
GOI	Government of Indonesia
ICC	Indonesia Cocoa Commission
ICCO	International Cocoa Organization
ICCRI	Indonesian Coffee and Cocoa Research Institute
IFC	International Finance Corporation
IPM	Integrated Pest Management
KIMA	Makassar Industrial Estate
PENSA	Program for Eastern Indonesian SME Assistance
PPP	Public-Private-Partnership
PRIMA	Pest Reduction Integrated Management
PsPSP	frequent harvesting pruning, sanitation and fertilization
R&D	Research and Development
SME	Small and Medium Enterprise
SMS	Self Financing-mass Certification
SNI	Indonesia National Standard
SUCCESS	Sustainable Cocoa Extension Services for Smallholders
UNHAS	University of Hasanuddin
USAID	United States Agency for International Development
VSD	Vascular-Streak Dieback
VAT	Value-added Tax

Measurement Unit

Extent

cm² = Square-centimeters (1.0 cm x 1.0 cm)
m² = Square-meters (1.0 m x 1.0 m)
Km² = Square-kilometers (1.0 Km x 1.0 Km)
a. = Acre or Acres (100 m² or 0.1 ha.)
ha. = Hectares (10,000 m²)
ac = Acres (4,046.8 m² or 0.40468 ha.)

Length

mm = Millimeters
cm = Centimeters (cm = 10 mm)
m = Meters (m = 100 cm)
Km = Kilometers (Km = 1,000 m)
Inch = 2.54 cm
ft = foot (0.3048 m)
mile = 1,609.34 m

Currency

US\$ = United State Dollars
JPY = Japanese Yen
Rp. = Indonesian Rupees

Volume

cm³ = Cubic-centimeters
(1.0 cm x 1.0 cm x 1.0 cm or
1.0 m-lit.)
m³ = Cubic-meters (1.0 m x 1.0 m x 1.0 m
or 1.0 K-lit.)
lit. = Liter (1,000 cm³)

Weight

gr. = Grams
Kg = Kilograms (1,000 gr.)
ton = Metric tons (1,000 Kg)
MCM = 1,000,000 cu-m = 810.68 acre-ft
ac-ft = 1,233.83 m³

Time and Others

sec. = Seconds
min. = Minutes (60 sec.)
hr. = Hours (60 min.)
cusec. = 28.32 lit/sec
cu-m/s = 35.31 cu-ft/sec

Exchange Rate

As of June, 2007
US \$ 1.00 = JPY 117.38
Rp. 1.00 = JPY 0.01286

CHAPTER 1 COCOA IN SOUTH SULAWESI

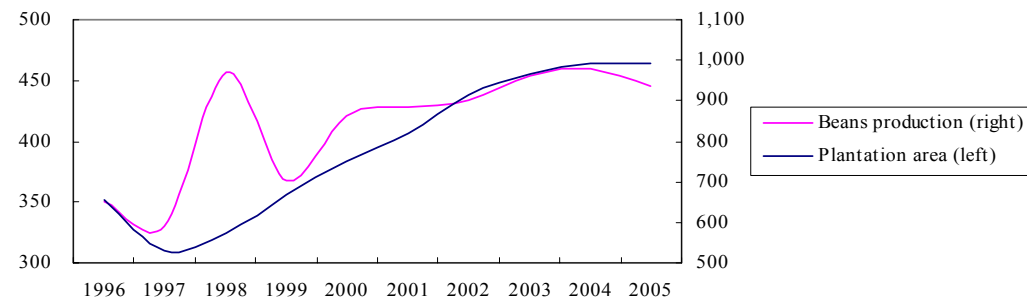
1.1 History of Establishment

Cocoa is believed to have been introduced to Indonesia from the Philippines in the sixteenth century. It may have been first planted in Sulawesi and moved later from there to Java. Until the mid 1980's, production of cocoa largely taken place in East Java followed by North Sumatra, and plantations were mostly operated in a large estate. Type of cocoa tree planted in Java was *Criollo* known as *Java Red*. But a spread of *Helopeltis* and Cocoa Pod Borer (CPB) infestations severely limited cocoa yield and production. In addition, the large estate operators had to continuously optimize the land use and changed crops to grow to maximize the economic return, according to the international market of crop commodities.

Faced by such constraints for production growth in Java, main production area has been gradually shifted to Sulawesi since the late 1980's, as considerable number of Sulawesi farmer (smallholders) started planting cocoa trees. Many farmers in Sulawesi, who relatively lacked sources of non-agricultural income, worked away from home to Malaysian plantation, and brought back cocoa seeds to plant. Coming to the mid to late 1990's, the world cocoa market saw a stable growth of demand, the cocoa farmers and the resultant planted area in Sulawesi had also increased accordingly.

1.2 Economic Presence of Cocoa

With over 445 thousand tons of cocoa beans (in dried form) produced in the latest year¹, Indonesia is the third largest producer in the world following Ivory Coast and Ghana. Its cocoa sector has grown substantially over the last 20 years, largely via sizable and stable production by smallholder farmers in the Sulawesi Island and without excessive government interventions. Around 70 to 80% of total production comes from the island on average.



Source: International Cocoa Organization (ICCO), DISBUN

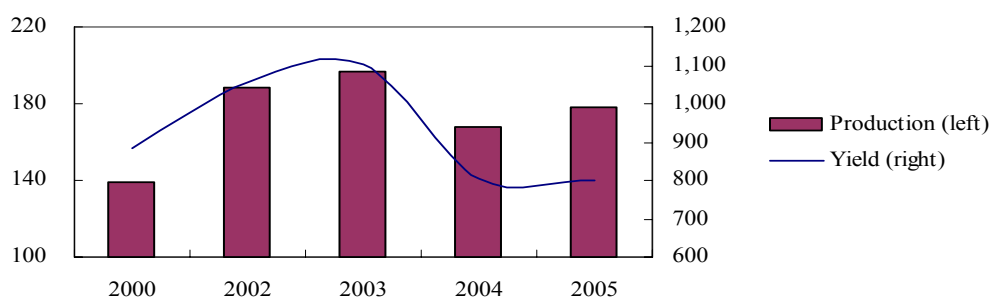
Figure 1 Cocoa Beans Production during the Last Ten Years in Indonesia (thousand tons and ha)

Growth of bean production after currency crisis was explained by the devaluation of Rupiah together with the highest productivity of most plants in Sulawesi at that time. Close to the end of 1990's, cases of CPB and other infections came to be reported, curving the pace of growth. Cocoa sector particularly in Sulawesi has somehow stagnated with regards to production growth during the last few years. Stable cocoa price in the world market since the

¹ This refers to the figure in "Quarterly Bulletin of Cocoa Statistics 2005/06". Although the Department of Agriculture and Central Bureau of Statistics publish the production figures, these seem to be overestimated, taking into account bean export figures and grinding performance in Indonesia.

beginning of this century has nevertheless helped sustaining the Sulawesi's production. Plantation area during the same period shows more steady growth, but productivity of cocoa has gradually declined mainly due to CPB infection and sluggish rehabilitation of plantation.

Yearly production of cocoa beans in the Sulawesi Island is estimated to amount to around 350 thousand tons (in dried form)². Although its relative presence among the island provinces has been smaller in the recent years, the South Sulawesi Province is one of extensive production bases in Indonesia, annually producing 170 to 180 thousand tons (close to 40% of total) in the last two years. Production of cocoa beans in the province is most intensive in two districts of Luwu (now divided into three districts and one city) and Pinrang. Bean production from these districts (133 thousand tons) accounts for as high as 74.6 % of total in South Sulawesi.



Source: BPS, DISBUN, ASKINDO

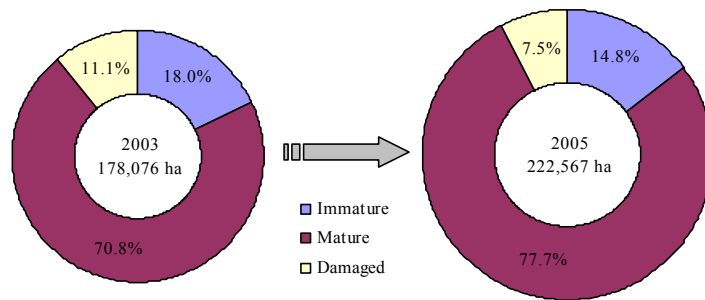
Figure 2 Cocoa Beans Production in South Sulawesi (thousand tons and kg/ha)

Cocoa sector plays a significant role in South Sulawesi economy in terms of earnings and employment generation. Not all farmers rely on cocoa beans as sole income source, earnings from cocoa production contributes to sustaining about 500 thousand smallholder farmers and their families in the Sulawesi Island and some 250 thousand farmers in South Sulawesi.

Growth of cocoa production in the past years has created thousands of business opportunity for trade intermediation (collection and local trading). Large scale trading and export industries have taken place mostly in Makassar and its outskirt industrial area (known as KIMA), where a number of warehouse facility is built for finishing activity such as drying, testing, grading (separation of waste), packing and shipping. These require labor intensive operation, thus contributing to local employment. Cocoa beans accounts for approximately 22.4% of total value of export from South Sulawesi (equivalent to USD 284 million) in 2004, after nickel.

Cocoa processing industry (grinding of beans to obtain cocoa products), though expected to bring more value addition, also takes place in Makassar but in a limited scale. Five processors are now active in Makassar (and one more prepared for operation in Kendari), particularly to produce cocoa butter (and powder as by-product as a result of butter extraction). But only a small portion (approximately 10%) of Sulawesi beans is now used for local processing. Most domestic processors are operating below their installed capacity.

² This refers to the estimate figure obtained from interviews to international traders and processors in Makassar. Reliable estimate of dry bean production was not available.



Source: DISBUN, ASKINDO

Note: Figure in 2003 excludes plantation area in the districts presently located in West Sulawesi Province.

Figure 3 Breakdown of Cocoa Plantation Maturity in South Sulawesi

Cocoa sector in South Sulawesi however faces difficulties and challenges without exception, as a result of expanding CPB and other infections and poor maintenance of aging plantation. This has brought about the lower yield and decreasing supply of good beans in the plantation, thus threatening sustainability of cocoa sector.

1.3 Cocoa for Farmers

Economic importance of cocoa cultivation differs among farmers, and usually depends on the scale of planted area held by farmers. Typical farmers in Sulawesi are said to show the strong adherence to paddy cultivation and place less priority onto the other crop plantation.

Table 1 Number of Cocoa Farmer and Average Holdings by District in South Sulawesi

Districts	2003			2005		
	Planted area (ha)	Farmer (No.)	Ha/Farmer	Planted area (ha)	Farmer (No.)	Ha/Farmer
Selayar	761	1,350	0.56	702	1,411	0.50
Bulukumba	4,059	7,110	0.57	5,136	7,927	0.65
Bataeng	1,276	2,996	0.43	1,849	3,683	0.50
Jeneponto	112	285	0.39	112	288	0.39
Takalar	34	165	0.21	36	165	0.22
Gowa	420	1,011	0.42	1,019	1,760	0.58
Sinjai	4,253	7,651	0.56	4,178	7,436	0.56
Maros	850	2,137	0.40	1,169	1,826	0.64
Pankep	244	679	0.36	246	679	0.36
Barru	646	1,400	0.46	861	1,403	0.61
Bone	28,335	43,432	0.65	30,075	38,271	0.79
Soppeng	11,148	21,089	0.53	12,962	20,033	0.65
Wajo	7,089	10,431	0.68	12,709	18,823	0.68
Sidrap	6,721	4,953	1.36	7,023	8,149	0.86
Pinrang	23,270	20,790	1.12	21,905	24,775	0.88
Enrekang	6,149	8,468	0.73	6,522	9,184	0.71
Tana Toraja	7,795	8,905	0.88	5,020	17,448	0.29
Luwu	27,640	25,068	1.10	27,796	23,093	1.20
Luwu Utara	47,274	42,019	1.13	47,326	40,941	1.16
Luwu Timur	-	-	-	32,132	20,159	1.59
Palopo	-	-	-	3,791	4,924	0.77
Makassar	0	0	0.00	0	0	0.00
Parepare	0	0	0.00	0	0	0.00
South Sulawesi	178,076	209,939	0.85	222,567	252,378	0.88
Mamuju	50,115	40,463	1.24	n.a	n.a	n.a
Majene	8,088	6,801	1.19	n.a	n.a	n.a
Polmas	57,578	47,845	1.20	n.a	n.a	n.a
West Sulawesi	115,781	95,109	1.22	n.a	n.a	n.a

Source: DISBUN, ASKINDO

Note: Three districts Mamuju, Majene, Polmas used to belong to South Sulawesi until the year 2003, now separated into West Sulawesi Province.

In the intensive districts of South Sulawesi, cocoa plantation can be a primary (or sometimes single) source of income for most farmers, who hold more than one ha per each on average. In other districts, however, cocoa plantation is usually secondary (or one of the plural) source of income for farmers, holding less than 0.5 ha per each on average.

But in general, cocoa plantation has become the secondary source of income for the majority of farmers in South Sulawesi. Many indicate that cocoa's presence in farmers' income together with their adherence to paddy production accounts for lesser resource and time mobilized by farmers for management of cocoa plantation.



Figure 4 Cocoa Production Area in South Sulawesi

Most of the farmers in South Sulawesi are owner farmers managing the land by themselves though there are few absentee farmers who reside in main towns and cities and their farms are cultivated by hired labor.

Many of the farmers have been settled down under transmigration programs implemented by the Government since 1960's. The holding size allocated usually varied depending on types of the land, highland only or highland and rice, and the remoteness of the area. As a result of population increase, land fragmentation has occurred, and the holding size has progressively come down. The local custom of land gift at marriages too has contributed to land fragmentation. In average, cocoa holding size of farmers in South Sulawesi varies between 0.29 in Tator District and 1.59 ha Luwu Timur District with an average of 0.89ha.

Although the land settlements have taken place decades ago, official transfer of ownership through land registration has been slow. Apparently the cost of official registration, which farmer has to pay, has been prohibitive. The government has implemented programs to accelerate formalization of legal ownership to the farmers, which are in progress.

1.4 Agro-ecology Concerning Cocoa Cultivation

The rainfall in Sulawesi is perhaps best described with reference to rainfall. In September and March, cool northwesterly winds pick up moisture while crossing the South China Sea and arrive in the west coast of South Sulawesi via Java Sea in the late November or the early December. After this period, variable, humid southeasterly winds blow towards the eastern Sulawesi and rainfall peaks on the southeast coast between April and June. The southeasterly winds from the dry wintry Australian landmass become stronger and these dry winds have a significant influence on the southern tip of the southwest and southeast peninsulas. Jeneponto in the south of southwest peninsula is subject to a long dry season between April and November.

Areas on the west coast of Sulawesi therefore tend to have their highest rainfall in December whereas those in the east coast have their wettest months around May. An intermediate area with two dry seasons (a bimodal distribution) is found in Pendolo and Pinrang in the middle of the Southwest peninsula.

Where the orientation of a range of mountains is more or less at right angles to the prevailing winds, the rainfall is higher on the windward side because of adiabatic cooling of moisture laden air. Thus Maros receives over 500 mm per month between December and February but towns on the leeward side of the peninsula receive little rain. Annual rainfall patterns at selected recording stations representing the districts in South Sulawesi based on 10-15 year averages are shown below.

Among other climatic variables, the temperature is relatively constant while others such as wind velocity, evaporation, and humidity change even within small areas. Temperature is mainly a function of altitude rather than the prevailing weather conditions and ranges between 21° to 33°C at the lower altitudes. The tropical sun and the oceans combine to produce continuously high humidity which ranges between 75 to 100%.

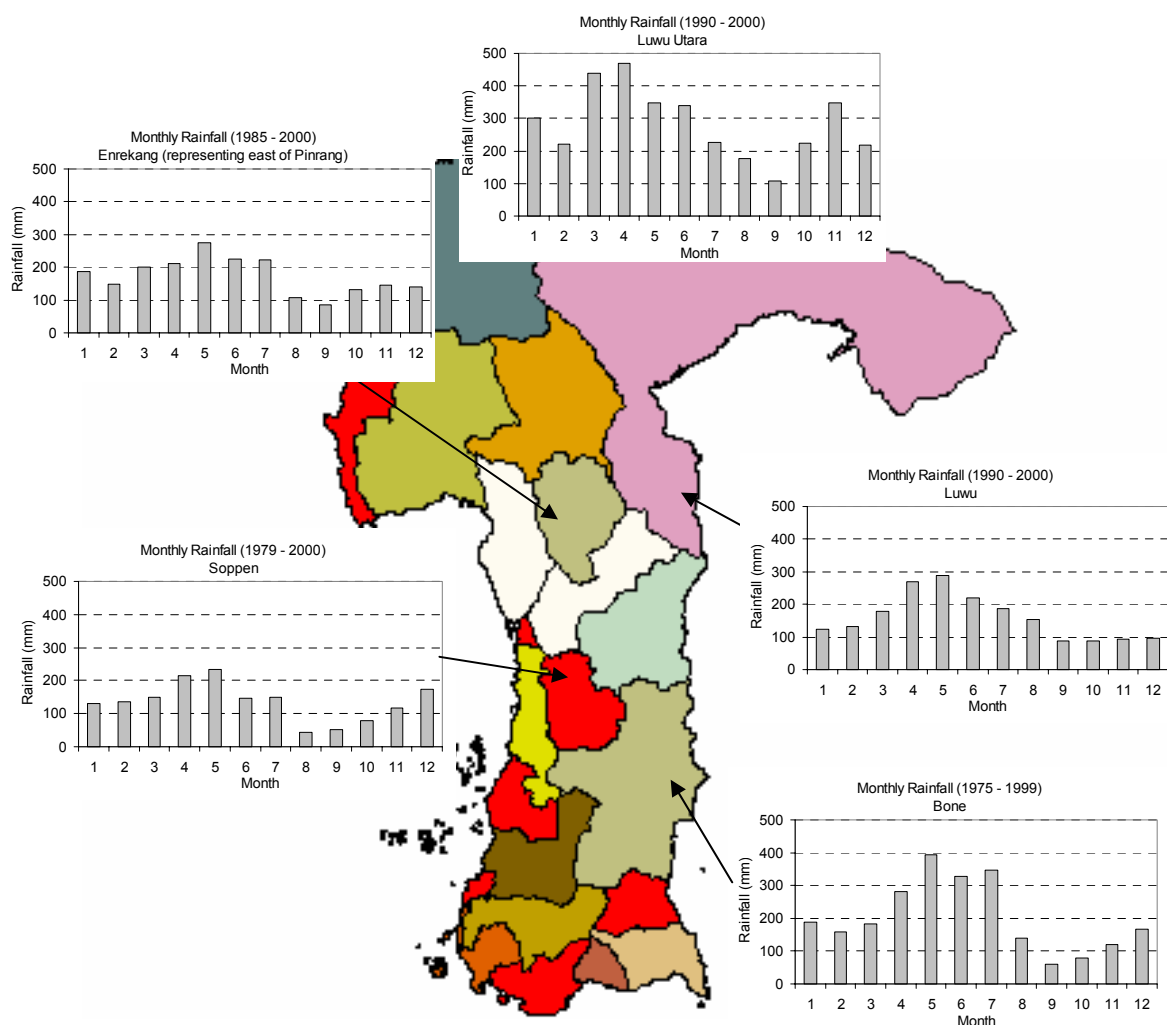


Figure 5 Monthly Rainfall in Major Cocoa Production Area

The complex geological history has contributed to the formation of a range of soil types which vary considerably across Sulawesi over the relatively short distances. All 12 major soil types of Sulawesi occur in South Sulawesi, a brief description of which is given below. Most of the central region of South Sulawesi is occupied by luvisol with fluvisol in the western and eastern coastal areas. Other soil types occur in pockets distributed along southern coastal area and in the interior.

Table 2 Major Soils of Sulawesi and their Characteristics

Soil type	Alternative	Characteristics
Histosol	Organosol	Peaty soils
Fluvisol	Alluvium	Soils transported by rivers
Regosol	Entisol	Weakly developed on sands
Rendzina	Mollisol	Shallow calcareous soils over limestone
Vertisol	Grumusol	Dark cracking clays
Andosol	Inceptisol	Soils on recent volcanic material
Luvisol	Mediterranean	Soils with clay particles deposited on B horizon and a base saturation > 50%
Ferric luvisol	Red-yellow podsol	As luvisol but with red mottles. CEC of clay fraction <24 meq/100g
Ferralsol	Latosol	Highly weathered, clay minerals dominantly kaolinite and CEC of clay fraction <16 meq/100g
Podzol	Spodosol	Bleached A horizon and secondary humus or iron rich B horizon

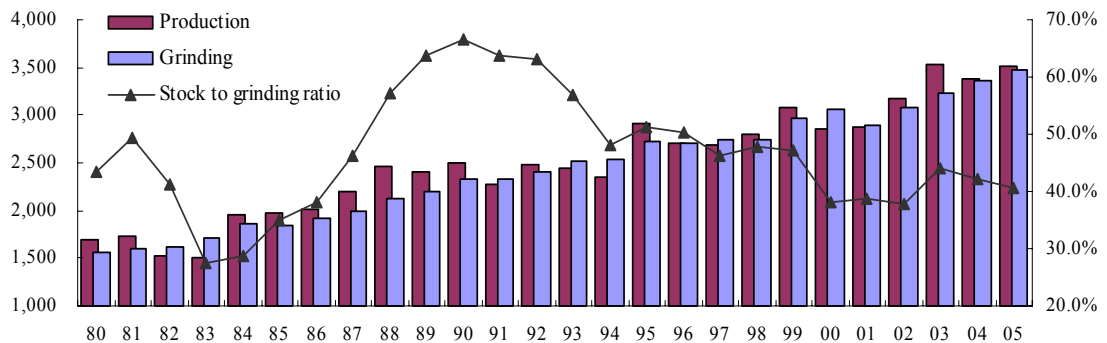
CHAPTER 2 COCOA MARKET ANALYSIS

2.1 Trend of the World Cocoa Market

2.1.1 Cocoa Beans

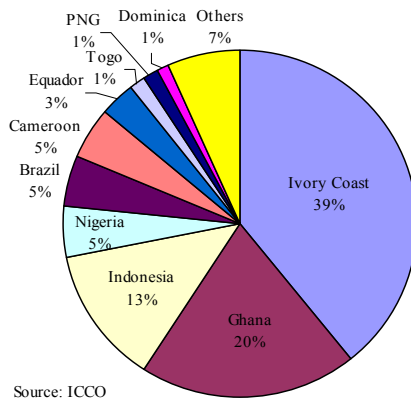
(1) Production

The world cocoa bean production amounts to around 3,500 thousand tons in 2005. Gross production has largely grown during the last ten years at the rate of 3.7% per annum, though experiencing yearly fierce fluctuation subject to the climate and political conditions of major producing countries. Some 90% of the world cocoa is produced by smallholder farmers. This growth of production also contributes to an increase of the world stocks of beans, help stabilizing the world cocoa market. Major producing countries of cocoa beans include Ivory Coast, Ghana, Indonesia, Nigeria, Brazil, Cameroon and Ecuador.



Source: ICCO

Figure 6 Trend of the World Cocoa Bean Production, Consumption (thousand tons) and Stock to Grinding Ratio (%)



Source: ICCO

Figure 7 The World Cacao Bean Production (3,500 thousand tons) by Country (2005)

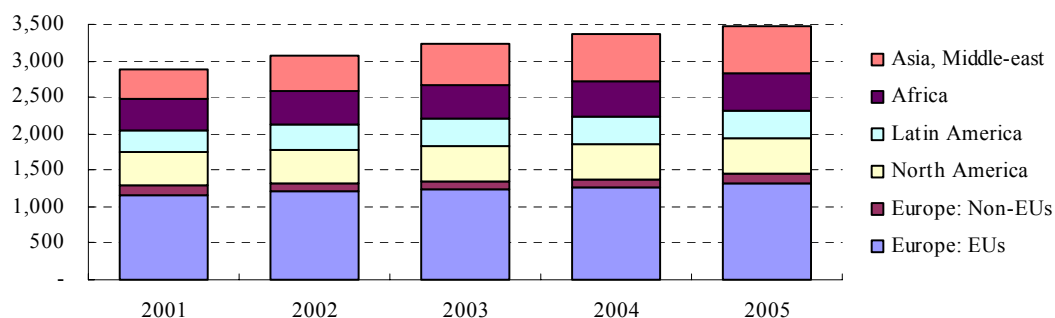
Once major producer, Malaysia has rapidly declined its cocoa bean production since the mid 1990's, because its state-led estates shifted the crop to grow to oil palm, which is more profitable option so far. Malaysia once produced 250 thousand tons in the late 1980's and presently some 30 thousand tons only. The share among major constituents has remained generally constant during the last five years, except for the fact that African producers gain more share while Asian ones relatively lose.

There are some factors which affect major cocoa producers and the world market. The largest producer (for bulk beans), Ivory Coast faces degradation of bean quality, caused by a mix of issues including shortage in labor, poor technical support to smallholders, aging of plantation, adverse effects of partial liberalization policy and smuggling as result of discouraging government pricing. The third largest Indonesia also faces expanding CPB infection and aging plantation, causing lower productivity and quality degradation. Introduction of certificate system for non-child labored product by USA and stricter enforcement of food

safety standards by importing countries may bring about substantial impacts on cocoa production on a global scale.

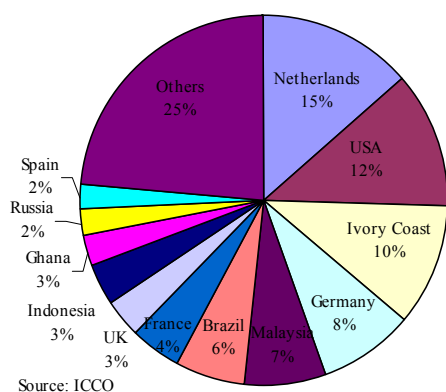
(2) Consumption

Consumption of cocoa beans is identified as processing (grinding) volume of cocoa beans. The world grinding volume reached to 3,354 thousand tons in 2005, and has also grown from the level of ten years ago (2,532 thousand tons in 1994) at the yearly rate of 2.8% on average. Stock to grinding ratio as an indicator for stock safety has maintained over 40% (considered as more than sufficient level) during the last few years.



Source: ICCO

Figure 8 Trend of the World Cocoa Bean Grinding (thousand tons)



Source: ICCO

Figure 9 The World Cacao Bean Grinding (3,474 thousand tons) by Country (2005)

Consumption of cocoa beans mostly takes place in EU countries (such as Netherlands, Germany) and USA, which have a large consumer markets for the final (chocolate and confectionary) products. Producing countries of cocoa beans such as Ivory Coast, Malaysia, Brazil and Indonesia are also major processors. These countries but for Malaysia (used to be a major producer) are able to make use of favorable access to materials. The share of the world grinding volume has seen no significant changes during the last five years. But relatively large increase of processing volume is observed in the Asian countries.

The global cocoa trade is shaped primarily for the end use of the cocoa beans. Some 5% of beans called as fine (or flavor) cocoa is traded for its distinctive flavor to manufacture chocolate for specialized niche markets, and the balance forms bulk cocoa from Africa and Asia. Fine beans fetch premium price over comparable bulk. Bulk beans, on the other hand, are the basic feedstock for cocoa and chocolate production. Beans of African origins are valued both for fat and flavor and most of Asian origins mainly for fat.

2.1.2 Cocoa and chocolate products

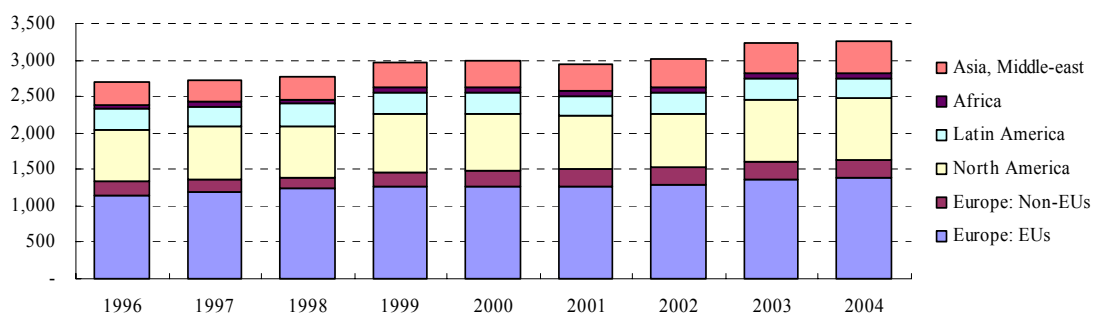
Cocoa products as a result of processing include paste (liquor or mass), butter, powder / cake. Beans are grinded to paste at first, then paste (blended with different origins of beans) is pressed to extract butter, leaving cake as a by-product. Cake is further milled to obtain powder. These semi-processed products are blended with other materials like milk and sugar

to produce chocolates or chocolate products. Producing countries of cocoa products are mostly identical to grinding countries. They consume domestically or export cocoa products to other chocolate producing countries.

Cocoa paste and powder / cake are those which the users' preference in flavor, color, odor and such does matter for. Therefore, bean origin and its preparation (fermentation) as raw material are determinants for quality of such products. While, this is not the case for cocoa butter (non flavor and color in nature), fat yield of beans is important.

Chocolate production (manufacturing) normally takes place near the end-market, since manufactures (and integrated ones who have processing plant as well) need to effectively blend cocoa (in paste form) made of each bean origin to produce their final products, according to the specification desired from each consumer market.

Consumption of cocoa and chocolate products is estimated to be around 3,260 tons in beans equivalent in 2004, and mostly takes place in the developed countries. Major consuming countries include USA, Germany, France, UK, Russia, Japan, Italy, Spain, followed by other EU countries and populous countries like Brazil and China.



Source: ICCO

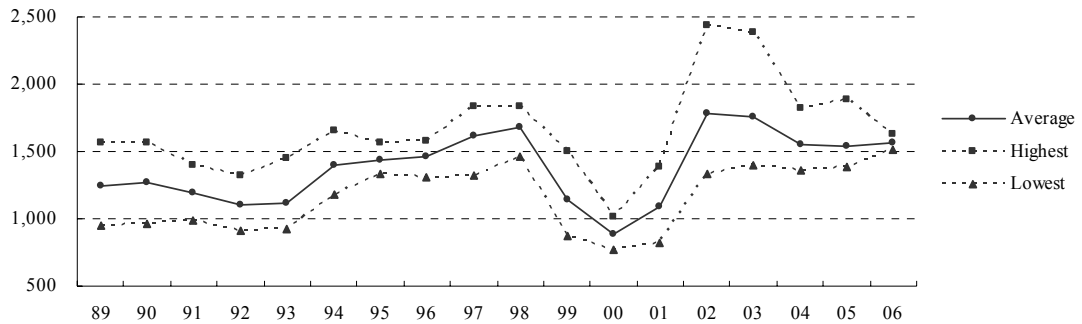
Figure 10 The World Cocoa and Chocolate Product Consumption (in Bean Equivalent in thousand tons)

Almost 70% of the world consumption of cocoa and chocolate products (around 2,278 tons in beans equivalent) takes place in EU and North American countries, although their growth of consumption is relatively static. Per-capita consumption in these countries on average reaches as high as 3.0 kg while that in Asian region is still 0.12 kg. However, remarkable growth of chocolate product consumption is seen in Asian and Middle-east regions. In these regions, total consumption has grown from 309 thousand tons in 1996 and 430 thousand tons in 2004 at the yearly rate of 4.2%, far exceeding those of EU (2.2%) and North American (2.1%) countries.

2.1.3 Prices in the world market

Most cocoa beans are globally traded on New York and London Commodity Exchanges. Sulawesi cocoa trade passes through New York Exchange which serves as the basis for bulk bean prices. Physical trade does not pass through the exchange, it is the mechanism used by importers and exporters to establish prevailing commodity prices.

The daily price of cocoa beans in New York ranges from US\$ 1,500 to 1,700 per ton during the recent year and remains relatively stable. Prices of cocoa beans have been subject to some degrees of volatility and fluctuation, determined by the present and forecasted demand and supply conditions, market participant's speculations.



Source: ICCO

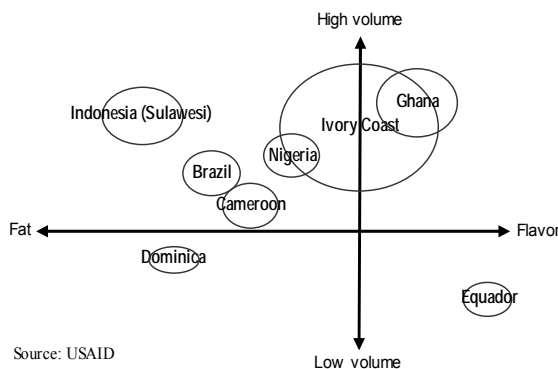
Figure 11 Price Movements during the Past Years (ICCO daily price in US\$ / ton)

During the late 2002 and early 2003, cocoa prices recorded the historical high of US\$ 2,375 per ton. But in 2004 the prices sharply dropped to the level of US\$ 1,347 per ton, 43% drop over a ten month period. Terminal prices of cocoa in New York during the last 10 years have repeated frequent up-and-downs, but shifted to the higher level as the long-term trend.

Importers typically buy cocoa beans from exporters on a free on board (FOB) basis. Most of the multinational traders of cocoa usually have tied up with the long-term and future contracts with manufactures. International trade of beans is mostly handled by several multinationals such as EDF&Man, Olam, Cargill, ADM, Continaf, Blommer, ARMAJARO. These multinationals usually establish their trading affiliates (or subsidiaries) and local connections in each major producing country.

2.2 Position of Sulawesi Cocoa in the World Market

Although Indonesia is the third largest producer of cocoa beans, cocoa beans from Indonesia (Sulawesi in particular), which have little flavor and low fat yield, are traded for fat as an unfermented bulk (falling in the category of Fair and Average Quality known as FAQ), and at discount to the New York terminal price (around US\$ 300 lower per ton) due to the poorer reputation on quality. Volume of beans is most important matter for Sulawesi bean trade. West Africa (Ghana and Ivory Coast) produces the same bulk beans, but their beans have a generally high content of both fat and flavor.



Source: USAID

Figure 12 Relative Position of Sulawesi Beans in the World Market

Competitive advantage for Sulawesi beans (in relative terms) lies in its ability to supply large quantity of fat beans at the lower cost, together with its favorable business environment. Higher melting point in the form of cocoa butter is another advantage of Sulawesi beans. Cocoa grown in Sulawesi has been developed for its high and fast yield for

bulk, not for flavor. Though controversial, the official record indicates that the current average yield of dry beans in Sulawesi ranges from 800 to 1,000 kg/ha. This figure is

quite high if compared to other producers such as West Africa, where its yield is much lower at around 300 kg/ha or less.

Dominica produces similar unfermented bulk beans, but its export volume (40 thousand tons) is far less than the size of Sulawesi. Fermentation of cocoa beans help bringing out their inherent flavor, but not generally done in Sulawesi since commercial incentive for such an additional post-harvest activity are weak. In Indonesia, Papua and Sumatra farmers ferment beans, but their production is still small and sold to local processors rather than exported.

Being widely known as unfermented bulk for fat, processors and manufactures find Sulawesi beans as a cheaper material of cocoa butter, and sometimes refer to as “filler”. Cocoa beans and products processed from Sulawesi beans are often blended with flavor-rich beans and products (in paste form) of different origins to add flavor to cater for specific requirements of each consumer market. They are also used for chocolate-like confectionaries, for which flavor is less important.

The world demand for unfermented bulk beans becomes relatively inelastic and not significantly affected by change in prices. As the largest producer of unfermented bulk beans, Sulawesi currently holds a strong and unique position with few apparent competitors in this segment. Thus, as some multinationals indicate, the factors which may affect its continued competitiveness in this segment lie in internal rather than external (demand, price, trade practice).

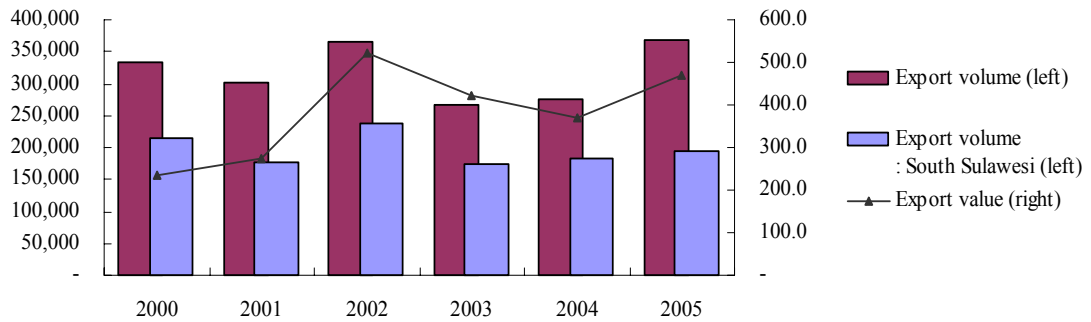
Internal issue here means its sustainability of cocoa production at the farm level, being undermined by decline in productivity and decreasing supply of good beans. Although regarded as low quality, exporters and processors mention that quality of Sulawesi beans in general becomes even worse in terms of bean count, waste content, fat content, leading to the lower fat yield.

Concerning cocoa processing, Sulawesi may find its export opportunity for cocoa butter which has no flavor orientation, on account of low price of beans and high melting point. Indonesia now processes beans largely to produce cocoa butter for export. But for other products, multinationals see less market opportunity for processors of Sulawesi beans to access. For powder / cake in particular, obtained as a by-product of butter extraction, processors find it difficult to find sizable market which demands these products made of Sulawesi beans.

2.3 Export Performance and Destination

Total value of cocoa bean export by Indonesia amounts to US\$ 467.8 millions in 2005, and has grown from US\$ 233.1 millions in 2000. Volume of export on the other hand has been statically shifted from 333.6 thousand tons in 2000 to 367.4 thousand tons in 2005, even seen declines both in 2003 and 2004.

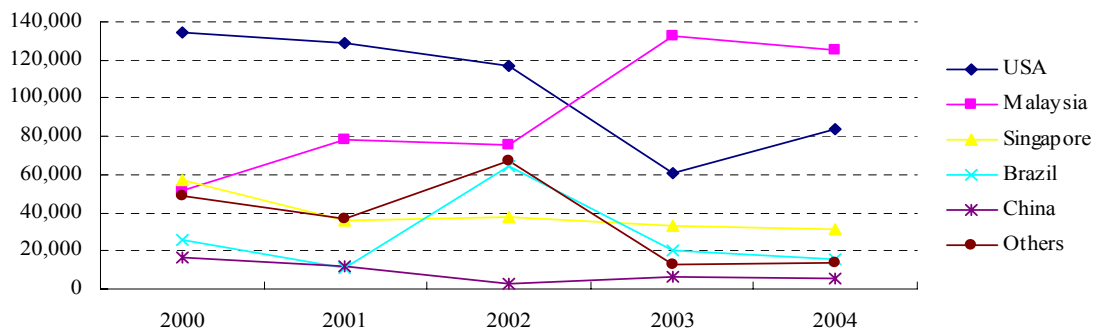
Upturn in the unit value of export from US\$ 700 to 1,270 per ton contributes to raising export earnings from cocoa beans without significant increment of volume during this period. Cocoa beans shipped from Makassar, a major port for export, account for some 52.6% both in volume and value of total Indonesian exports in 2005. Including cocoa beans shipped from Palu in Central Sulawesi, contribution would be more, almost close to around 85%.



Source: BPS

Figure 13 Indonesian and South Sulawesi Exports of Cocoa Beans (Tons for Volume and Million USD for Value)

Although USA used to be the biggest export destination of cocoa beans from Indonesia, this has been replaced with Malaysia since 2003, followed by Singapore and Brazil. These four destinations accounts for 93% both in volume and value. Imports by USA from Indonesia once reached 136 thousand tons in 2001, however, has declined to 84 thousand tons in 2004.



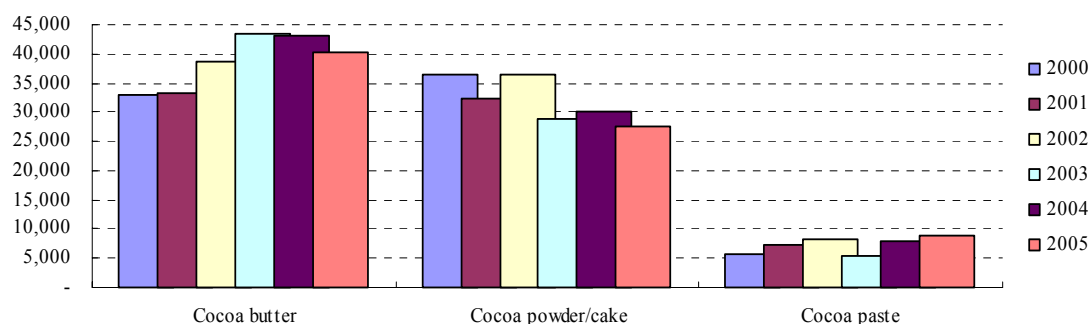
Source: BPS

Figure 14 Destinations of Indonesian Cocoa Bean Exports (tons)

This decline has been explained by the tighter food safety control by USA and difficulty in supply of good beans which satisfy the buyers' standard. Such loss of export earnings to USA has however been compensated by growing imports by Malaysia. Malaysian imports of cocoa beans from Indonesia have rapidly grown from 82 thousand in 2001 to 125 thousand tons in 2004.

Since export competitiveness for Sulawesi beans lies in its ability to supply large quantities of bulk beans at the low cost, decline in productivity and decreasing supply of good beans (lower fat yield), being caused by pest infestations (CPB in particular), and stagnant re-plantation and rehabilitation of aging plantation, may undermine such competitive advantages in the near future.

Export destinations always have large-scale grinding plants to process cocoa products. Processing industries in these countries are close to the chocolate manufactures to cater for their each specific requirement for cocoa products, and usually have the long-term supply commitments to the manufactures. Indonesia has also more than tens of private processing companies (five ones in Makassar, and one to be started in Kendari), primarily to process cocoa butter. However, the existing processors are facing difficulty in securing consistent supply of good beans which meet their minimum requirement, mostly being either non-operational or operating below capacity.



Source: BPS

Figure 15 Indonesian Exports of Cocoa Products (tons)

Nevertheless, Indonesia has been remaining the fifth largest exporters of cocoa butter (40.4 thousand tons in 2005) during the last five years, and the sixth largest for cocoa powder / cake (27.7 thousand tons in 2005) for the same period. The top major exporters of cocoa butter and powder / cake in the world market include Netherlands, France, Ivory Coast, Malaysia, and Brazil.

The biggest buyer for cocoa products from Indonesia is USA, which buys 13.5 thousand tons of cocoa butter (31.0% of total export volume) and 4.0 thousand tons of cocoa powder (13.7%, for non sugar-contained one). Indonesian subsidiary of Masterfoods Inc., PT. Effem's processing operation (in Makassar) accounts for such large imports by USA. France and China follows for cocoa butter imports, and China in particular expands the volume of imports rapidly. For cocoa powder / cake, many countries such as Spain, Philippines, Bulgaria, Singapore, China, Australia import from Indonesia, though the volume of each is quite fraction.

Though exporting some volume of cocoa products, Indonesia does not gain relatively enough value addition from its processing activity, if compared to other exporters of cocoa products. Aside from a difference in the operational costs, one of the factors to explain such lower values is a discounted pricing and high import duty for Indonesian cocoa products when imported. Price discount occurs since importers usually regard its quality of material (beans) as lower compared to other origins.

Table 3 Unit Value of Cocoa Product Exports by Major Exporting Countries (US\$/ kg)

Cocoa Products	Indonesia	Malaysia	Brazil	Ivory Coast	Netherlands	France	USA
Cocoa butter	2.51	2.91	3.07	3.13	3.61	3.76	3.95
Cocoa powder / cake	1.47	1.86	2.02	1.78	2.85	2.83	2.48
Cocoa paste	1.23	2.19	2.16	2.18	2.52	2.64	2.81
Cocoa beans	1.34	-	-	1.58	-	-	-

Source: calculated by the Study Team based on FAO statistics

2.4 Growing Markets

Though total bean consumption volume is still smaller, the largest growth of cocoa bean consumption (equivalent to grinding volume) takes place in the Asian and Middle-east countries. Total processing volume in this region increases to over 635 thousand in 2005 from 416 thousand tons in 2001 at the yearly rate of 11.2%, far exceeding 2.6% of EU and North American counterparts. Malaysia, China and Turkey are fastest growing processors in the region. These countries have rapidly expanded their grinding volumes at annual rates by

over 30%, 43%, and 17% respectively during last few years. Their annual grind reaches 259 thousand, 36 thousand, and 60 thousand tons in 2005.

According to multinationals, these countries currently process beans and export cocoa products to the major chocolate consumption countries, but at the same time have targeted the growing markets in their regions (Middle-east for Turkey, India, South-eastern and North-eastern Asia for Malaysia, domestic market for China).

For example, Malaysian imports of cocoa beans have rapidly grown from 107 thousand in 2000 to 244 thousand tons in 2004. Sulawesi has been the largest exporter of cocoa beans to Malaysia, and increased from 82 thousand in 2001 to 125 thousand tons in 2004. Eleven processing plants with annual capacity of 300 thousand tons are now under operation in Malaysia, but mostly rely on import for cocoa beans since they face a large reduction in domestic production.

Malaysian processors largely grind for cocoa butter production. Butter is the highest contributor to the total cocoa related export earnings, accounting for some 60% followed by cocoa powder (18%). USA has been the largest export destination of Malaysian-made cocoa butter (30% of total export). Cocoa powder has been largely exported to Japan (65%) and USA (20%).

China is also expanding processing capacity, although nascent, and increasing cocoa bean imports to 43.5 thousand in 2005 from 9.1 thousand tons in 2002, and now imports 5.5 thousand tons from Sulawesi. But China is so far regarded as the market for low quality cocoa, where sub-standard beans are imported and bean shells are not removed during the processing. Turkey also has expanded imports of beans from 28.2 thousand in 2000 to 66.4 thousand tons in 2005, becoming the ninth largest importer of cocoa beans.

For the markets for cocoa and chocolate products, a remarkable growth of product consumption is again observed in Asian and Middle-east countries. In these regions, total consumption has grown from 309 thousand in 1997 and 430 thousand tons in 2005 at the yearly rate of 4.2%, outstripping those of European (2.4%) and American (1.6%) regions. Growing consumers are India, China, Turkey, Israel, Saudi Arabia, and Egypt.

Among these, China again expands the imports both of cocoa butter and powder / cake. Volume of imports amounts to 3.7 thousand for cocoa butter in 2005 from 2.5 thousand tons in 2002, and 18.5 thousand for powder and cake in 2005 from 8.3 thousand tons in 2002. Indonesian Cocoa Industry Association (AIKI) forecasts that Chinese demand for cocoa products would annually grow by 10 to 15% for the next five years.

Unlike European market where flavor-rich and higher quality chocolates (mainly sourcing bulk beans from West Africa and Latin America) are favored, these growing and other Asian markets are considered to follow a characteristic of American market and show more taste for mass-produced and chocolate confectionaries, which demand a consistent supply of cocoa products made of “low-cost filler” beans like Sulawesi.

2.5 Competition for Market Penetration

As mentioned, Sulawesi beans fall in the category of FAQ, having little flavor and low fat yield, and are traded as an unfermented bulk. Competitive advantage for Sulawesi beans lies in its ability to supply large quantity of bulk beans at the lower cost. Growth of cocoa consumption in Asian and Middle-east countries is likely to push the demand for bulk beans from producers like Sulawesi. Unless the issues of decline in yield and decreasing supply are adequately addressed, however, the present position of Sulawesi as major bulk bean supplier may be eroded and replaced with emerging bulk bean producers like Sumatra, Vietnam, Papua New Guinea and Philippines. In fact, the growth of cocoa beans production in such regions is about to expand in the near future.

Competition is considered to be more severe in case of cocoa products. For traditional markets of cocoa products like USA and EU countries, it would be a difficult challenge to break into the connections established between the existing cocoa processors and manufactures, since manufacture tends to adhere to the long-term supply by reliable processor with consistent specifications. This is more apparent in case of cocoa paste and powder / cake, for which the users' preference in flavor, color, odor and such does matter. As for butter, for which users are less concerned with bean origin and quality, processors can still have a room to offer competitive prices to compete in the market.

Local processors in Indonesia may be able to compete in such markets by offering cocoa butter on account of competitive pricing and high melting point, but still have to clear the issue of marketing of by-products such as powder / cake. Local processors are often compelled to sell cocoa powder / cake at or below cost of production and to recover the loss from the sales of cocoa butter without exercising competitive pricing.

Growing demand for cocoa products is observed in the emerging markets, but market penetration to even these new markets may also make Indonesia face fierce competition. Expansion of processing capacity in other countries such as Malaysia and China will lead to more participants to enter the cocoa products market. Malaysian cocoa processing industry is considered as an immediate competitor to Indonesian counterpart. Malaysian government now envisages that Malaysia become one of the world leading cocoa processors by 2010 and expects further investments in cocoa industry.

In this regard, where processors decide to locate and enhance their operation and how government takes support and regulatory measures for processing industry will affect the future performance of Indonesian export of cocoa products. Interestingly, one of two recently commissioned plants in Malaysia is owned by the largest confectionary manufacture in Indonesia, the Ceres, which expands its operation throughout Asia.

Table 4 Import Tariffs of Cocoa Beans and Products for Selected Countries

Cocoa products	Malaysia	China	India	Pakistan	Japan	EU	USA
Cocoa beans	Free	8.0	30.0	10.0	Free	Free	Free
Cocoa paste (not defatted)	25.0	10.0	30.0	20.0	5.0	9.6	Free
Cocoa paste (wholly / partly defatted)	19.0	10.0	30.0	20.0	10.0	9.6	0.20/kg
Cocoa butter	10.0	22.0	30.0	20.0	Free	7.7	Free
Cocoa powder (not containing sugar)	19.0	Free	30.0	20.0	12.9	8.0	0.52/kg
Cocoa powder (containing sugar)	15.0	10.0	30.0	25.0	15.0	8.0 +	to 10.0
Other preparations	15.0	10.0	30.0	25.0	21.3	8.3 +	to 10.0

Source : Indonesia Cocoa Directory

Import tariffs on cocoa beans and products enforced by the competing and market countries can be obstacle for market penetration. In general, countries which hold a certain scale of processing industry impose high blocking tariff for cocoa products, but import beans with no or lower barrier. In this connection, trade facilitation initiatives such as ASEAN and bilateral Free Trade Agreement (FTA) would bring impacts in cocoa product exports by Indonesia. For instance, China recently removed import tariff on cocoa powder (sugar-containing) from Indonesia, but not yet on cocoa butter or non sugar-containing powder.

Malaysia as an immediate competitor for cocoa products goes ahead in this regard, and now can benefit from a zero-tariff for the five cocoa products originating from Malaysia to China under the Early Harvest Program (EHP). ASKINDO (Indonesian Cocoa Traders Association) claims that Indonesia would lose out to Malaysia in grabbing share of China's expanding cocoa market, since it has to bear import duty ranging from 8 to 22% for its cocoa beans and cocoa products until at least 2007. While the lobbying activity to realize favorable trade terms is import for export promotion of cocoa products, the existing processors together with farmers need to take measures to assure sufficient supply of good beans, to vitalize their plant operation.

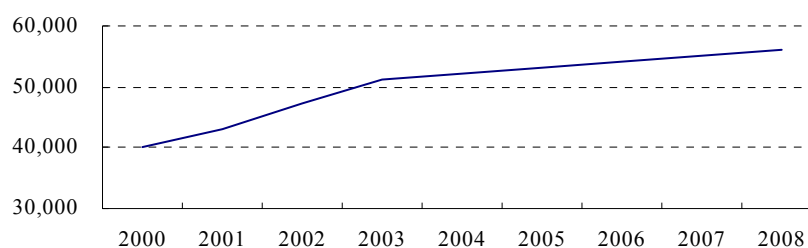
2.6 Domestic Market for Cocoa Products

Domestic market for cocoa products exists to some extent, mostly demanded by a few large confectionary manufacturers such as the Ceres, and small ones for chocolate confectionary, chocolate drink, bakery, biscuit, ice cream. Table below shows how much cocoa products are domestically produced and distributed.

Table 5 Sources and Uses of Cocoa Products in Indonesia (thousand tons)

Cocoa products			2000	2001	2002	2003	2004
Butter	Sources	Domestic production	50.7	53.5	63.9	64.8	66.3
		Import	-	-	-	-	-
	Uses	Export	33.0	33.2	38.8	43.4	43.2
		Domestic consumption	17.7	20.3	25.2	21.5	23.3
Powder / cake	Sources	Domestic production	52.4	49.4	54.0	51.3	52.2
		Import	2.8	2.3	2.4	2.4	4.0
	Uses	Export	36.4	32.2	36.4	28.9	30.1
		Domestic consumption	18.7	19.5	20.0	24.8	26.0
Paste	Sources	Domestic production	7.9	8.4	10.1	10.2	10.5
		Import	1.5	3.2	2.0	5.1	2.9
	Uses	Export	5.6	7.3	8.2	5.3	7.8
		Domestic consumption	3.7	3.2	2.0	5.1	2.9

Source: Indonesia Cocoa Directory, partly adjusted by the Study Team



Source: Indonesia Cocoa Directory

Figure 16 Domestic Demand for Cocoa Products with Projection (from 2005) (tons)

Although the size of domestic market for cocoa products and pace of its market expansion seem still limited, but the market is expected to grow steadily, particularly for cocoa butter and powder, driven by increasing buying power of the medium to high income classes.

CHAPTER 3 SUPPLY CHAIN DESCRIPTION AND ANALYSIS

3.1 Overall Supply Chain of Sulawesi Cocoa

3.1.1 Overview description

Major supply chain participants in Sulawesi cocoa include i) farmers (or farmers' groups), ii) intermediaries (traders and collectors), iii) exporters, iv) local processors, v) importers (multinational traders and processors), vi) manufactures, and vii) supporting institutions (e.g. R&D, government, donors). Brief description of supply chain participants is given below (supporting institutions are briefed at the later section).

Farmers There are approximately 500 thousand farmers in Sulawesi and 250 thousand in South Sulawesi, who farm an average of less than one ha each, and produce bulk and unfermented beans. They usually form farmers' group. Volume of yearly production in the latest year amounts to 350 thousand or more tons (in dried form) in Sulawesi and 170 thousand tons in South Sulawesi. Some large estates also grow cocoa, but their supply less than 10% of the total national production.

Intermediaries Intermediaries include collectors and local traders. Collectors mostly stay near the village or are sometimes farmers by themselves. They travel to farms and purchase beans from farmers once or twice per week during the peak harvest seasons. Scale of buying by each is small and turnover is very rapid. Before harvest, collectors sometimes provide advances to farmers. Collectors mostly sell beans to local traders.

Traders purchase beans from collectors or sometimes from farmers. They also purchase at collection points (town market) and arrange transport to exporters in Makassar (Palu in case of Central Sulawesi) or local processors. Buying volume depends on availability of working capital of each. There may be thousands of traders and collectors in Sulawesi. ASKINDO is an association body, which traders and exporters belong to.

Exporters Exporters are grouped into i) affiliates (or subsidiaries) of multinational traders and processors with a larger financial and firm buying back-up, and ii) 20 to 30 local exporters, which have relatively smaller working capital and limited international communication.

Affiliate exporters of multinationals purchase bulk beans from any sources, and sell to importers in Malaysia, USA, Singapore and Brazil for processing. ASKINDO estimates that some 80% of total Sulawesi bean export is now handled by these large exporters.

Local exporters are largely located in Makassar and Palu, and buy beans from traders who deliver their warehouses, and sell primarily to importers of own network, but also to local processors. Local exporters have increasingly found it difficult to compete with affiliates of multinationals.

Local processors There are tens or more processors in Indonesia. Five plants are located in Makassar (one more in Kendari). Other plants are located in Java. Approximately 10% of Sulawesi bean production is processed domestically. Local processors buy beans primarily from traders and exporters, and most have established network of bean suppliers. Some purchase beans from other regions of Indonesia. The largest local processors include General Food Industry (managed by Kuwait-based Petra Foods) and Davomas Abadi. Makassar's largest are Maju Bersama and Effem (managed by Masterfoods).

Local processors can be grouped into two types. Ones (such as Effem, General Food Industry) operate plants mainly for their group network. Others are “Indonesians”, which sell their cocoa products to any markets. Processors usually produce butter and powder, and export them to USA, Singapore, China, Brazil and EU. AIKI was established to represent the industry.

Importers	<p>Importers are traders and processors. Multinationals, mentioned previously, are grouped here. Some multinationals only deal with bean trading to sell to processors, but a few also run processing plant at the places, to which Sulawesi beans are exported, and sell cocoa products to manufactures in various regions.</p> <p>Some Asian processors, mostly located in Malaysia and Singapore, also source Sulawesi beans directly from exporters, and some overseas manufactures also do for their internal cocoa processing. In addition, there are many small-scale agents and traders (mostly based in Malaysia and Singapore) dealing with Sulawesi beans, who sell to Asian processors.</p>
Manufactures	<p>Manufacturing is the process of producing finished chocolates or chocolate products, and generally located close to their final consumer market. Though domestic consumption is still small, there are a number of local small-scale manufactures producing confectionaries and sell to middle to upper class consumers. The Celes is one of the few large integrated manufactures in Indonesia and exporter of chocolate products to Asian markets.</p> <p>US manufactures (e.g. Harshey Foods, Masterfoods, Cadburys) are the largest user of cocoa butter made of Sulawesi beans, followed by European (e.g. Lindt), Southeast Asian manufactures. Cocoa powder from Sulawesi beans is used evenly among USA, Asian and European manufactures.</p>

Relations among participants in this supply chain are shown in the figure below.

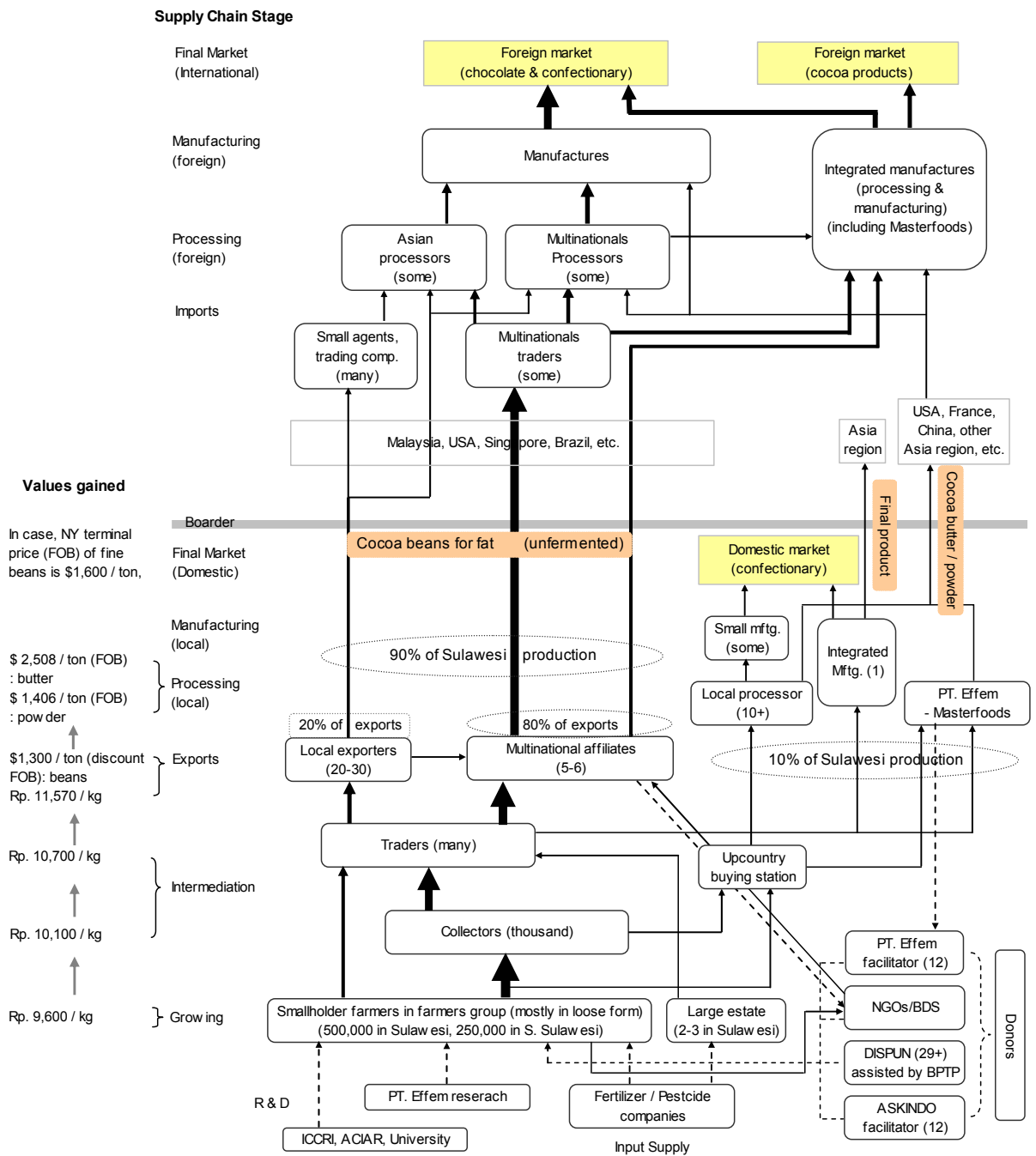


Figure 16 Supply Chain Map for Cocoa Sector in Sulawesi

3.1.2 Governance and characteristics of supply chain

(1) Supply of beans

Overall, supply chain of Sulawesi cocoa is characterized with market-based governance and with little degree of artificial coordination. In other word, there are no participants or institutions who can exercise dominant control over the chain, and costs of switching to new partners are low for both buyers and sellers.

The world price of Sulawesi cocoa beans, determined by New York terminal market, is a primary signal for the participants in the supply chain, and is offered in discounted terms, since users of Sulawesi beans repute them as inferior in quality (unfermented and low fat yield). Price information is available throughout the supply chain, although some farmers

state that they do not access to price information through mass media and are dependent on traders' offer. On the other hand, quality related information (buyers' requirements) on beans, to be channeled from buyers (exporters and processors) via intermediaries to farmers, is hardly relayed and often neglected by intermediaries and farmers.

As a result, trade of Sulawesi beans has been driven by volume-based deals, not quality-based one. This often makes intermediaries mix good beans with bad ones and wastes as a practice to merely gain the volume and their revenue, and may incur considerable cost of grading to exporters and processors since the amount handled by them is a quite large. It is difficult to discourage such practices, unless adequate commercial incentive is given from the later stage participants of supply chain.

Transaction of cocoa beans at domestic level is primarily conducted on "cash and carry" basis, which requires sufficient working capital to remain competitive. Intermediaries usually rely on advances from their buyers to finance these frequent purchases. Such advances from exporters or traders, whether in cash or in-kind, are one of the main tools to leverage the buying volume and assure consistent supply. However, intermediaries who depend on advances, have tendency to be captive, and interested not in quality. Farmers also tend to deal with those who buy their beans soon after harvest (beans are still wet before drying) for immediate cash needs.

The degree of interaction among supply chain participants is often based on perceived trusts and risks. In Sulawesi, "commitment-based" buying agreement (as means to assure consistent supply with a certain quality standard and to motivate farmers to improve quality of beans) between farmers and buyers is limited practice so far.

But, the basis which allows supply chain participants to exercise volume-based transaction (i.e., competitiveness of Sulawesi beans lies in its ability to supply large quantities of bulk beans) has been undermined by decline in productivity and the resultant decreasing supply of good beans (lower fat yield and higher waste ratio). This may affect participants' behavior towards cocoa throughout supply chain in many ways.

(2) Supply of cocoa products

As with cocoa beans, value and price of cocoa products too are influenced by factors such as production standard (such as HACCP and IQ-Net), quality consistency, bean origin, ability to supply in quantity and time, and trust between buyers and suppliers. Manufacturers who use cocoa products as raw materials must make severely certain that detailed specifications of its end products including flavor, odor and color are met at all cost to maintain product brand and quality. Some larger manufacturers prefer to integrate cocoa processing into manufacturing as in-house or subsidiary operation to ensure consistency of product supply and quality.

Cocoa products are industrial semi-products. Users of cocoa products (manufactures) usually find it more secure for them to adhere to particular cocoa processors who have been familiar with their specifications on the products. Therefore, it would be a quite difficult challenge to break into the connections established between the existing cocoa processor and manufacture. Manufacture tends to maintain long-term supply commitment with consistent specifications by identified processors. This is more obvious in the traditional market of cocoa products

like USA and EU, and in case of cocoa paste and powder / cake for which the users' preference in flavor does matter.

As for cocoa butter, for which users are less concerned with bean origin and quality, processors can still have a room to offer competitive price to compete in the market. But in case that processors source Sulawesi beans for a material, it is necessary to clear the issue of marketing of by-products of powder / cake which are poor in quality (flavor in particular). Markets for these products are limited in size and low-end ones. Local processors are often compelled to sell powder / cake at or below cost of production and to recover the loss from the sales of cocoa butter without exercising competitive pricing.

3.1.3 Margins and distribution

Unlike many cocoa farmers in Africa and Latin America, Sulawesi cocoa farmers receive on average high percentage of the international price. The farm-gate price for Sulawesi beans can reach around 80% of New York terminal price (but discounted one due to lower reputation on quality). On the other hand, in West Africa, cocoa farmers can gain as little as 50 to 60% of their FOB price (but not discounted). Highly competitive nature of the trading system, good transportation and almost no government interference (except for export levy in South Sulawesi) have helped to realize such high ratio for Sulawesi cocoa farmers.

The remaining balance is shared among other participants in the supply chain. According to exporters in Makassar, the margin between FOB and farm-gate price can be broken down into marketing / logistical costs (10%), intermediary (3 to 4%) and exporter margin (2 to 3%). Given these competitive margins, the large number of intermediary and exporter in the supply chain has come to depend on quick turnover and high volume deals.

The prices that market rewards for Sulawesi beans are based on "discount process". The daily terminal price at New York is relatively available to any participants throughout supply chain, and serves as the basis for an initial price determination. Once an initial price is known, intermediaries and exporters start discounting the price according to their own quality parameter of beans.

Parameters for discounting at the exporter and processor level include moisture content, bean count (bean size, in other word), waste content, moldiness, and bad bean content. At the farm-gate and collector levels, moisture and appearance are factors to be reflected in the discount process, along with a margin that also reflects cost of intermediation (such as logistics). Then exporters practice discount process for beans offered by intermediaries to derive the prices with due consideration of their marketing / logistic costs and margin before FOB price.

3.2 On Farm Activity (case study in Pinrang District)

3.2.1 Profile of the district and cocoa farmers

The study takes Pinrang District as a subject of case study for on farm activity. Pinrang District is one of the major cocoa production centers in South Sulawesi after Luwu and Bone. Cocoa is cultivated in all sub-districts. Most cocoa farms are owned and cultivated by smallholder farmers, with only about 437 ha (equivalent to 2% of the area) being managed

by private company. Sub-districts of Lembang, Batulappa, Duampanua and Patampanua account for over 73% of the total area of 21,905 ha under cocoa in the district.

Table 6 Cocoa Plantation Area and Average Holding per Farmer

Sub-District	Area (ha)	No. of farmers	Av. holding (ha/farmer)
Lembang	7,326	7,448	0.98
Batulappa	3,930	4,903	0.80
Duampanua	2,510	3,020	0.83
Patampanua	2,380	2,609	0.91
Paletang	1,441	1,557	0.93
Tiroang	1,414	1,437	0.98
Mattiro Balu	1,040	1,132	0.92
Cempa	579	971	0.60
Lasinrang	554	624	0.89
Suppa	283	413	0.68
Mattirosompe	249	313	0.80
Watang Sawitto	199	219	0.91
Total Pinrang	21,905	24,646	0.89

Sources: DISBUN and BPS in Pinrang

For the detailed site study, Desa Kassa (rural village) and Kelurahan Tonyamang (urban village) from two sub-districts of Batulappa and Patampanua respectively, were selected considering the differences in the farming attitude. Most farmers in Kassa depend on cocoa as a main source of household income, while the majority in Tonyamang cultivates both cocoa and rice, with the latter as a main. A sample of 25 farmers from each village was selected randomly for questionnaire survey. A summary of information on the two villages, farm characteristics and plant condition are presented below.

Table 7 Village, Farm and Crop Characteristics

Description	Unit	Status	Tonyamang (Patampanua)	Kassa (Batulappa)	Average
Total land area	ha		2,057	3,150	-
Cocoa area	ha		989	1,120	-
Rice area	Ha		926	399	-
Population	No.		4,304	3,329	-
Population density	No./km ²		209	105	-
No of households	No.		872	694	-
Distance to city	km		9	21	-
Cocoa holding (%)		<0.50 ha	60	36	48
		0.51-1.00 ha	32	48	40
		>1.1 ha	8	16	12
(Average holding size)			0.52	0.79	0.65
Ownership (%)		own	88	96	92
		others	12	4	8
No. of locations (%)		1	76	92	84
		>1	24	8	16
Crops (%)		cocoa only	32	80	56
		cocoa & rice	68	20	44
Income structure (%)		Cocoa	25	70	-
		Rice	44	20	-
		Trading	24	4	-
		Skilled labor	4	0	-
		Pension	4	4	-
Distance to farm	km	average	1	1.5	1.3

Description	Unit	Status	Tonyamang (Patampanua)	Kassa (Batulappa)	Average
Plant population (%)		<250 / farmer	36	24	30
		251-500 / farmer	52	40	46
		501-750 / farmer	12	24	18
		751-1,000 / farmer	0	8	4
		>1001 / farmer	0	4	2
(Average plant No)	/ farmer		322	493	407
Plant age (%)		<8 year	0	0	0
		9 - 12 year	4	0	2
		13 - 16 year	12	8	10
		17 - 20 year	72	80	76
		21 - 24 year	8	12	10
		>25 year	4	0	2
(Average plant age)	Year	-	17.8	18.6	18.2
Crop pattern (%)		cocoa only	84	68	76
		mixed	16	32	24

Source: The study team

Tonyamang is located approximately 9 km away from Pinrang city with a population density of 209 per km² and the agricultural land area of 1,131 ha is mainly cultivated with irrigated rice (926 ha) and cocoa (989 ha). Kassa on the other hand, is located more than 20 km from the city. It has a population density of about 105 per km² and out of the total agricultural lands of 3,150 ha, about 400 ha is cultivated for rice and 1,120 ha of uplands for cocoa. A general housing condition of the farmers is considered to be the better, if compared to non-cocoa farmers elsewhere in South Sulawesi. Apparently this is a result of high income generated from cocoa during the booming in the mid to late 1990s, when cocoa prices rose to Rp. 20,000 to 25,000 per kg.

Average size of a cocoa plantation per farmer was 0.65 ha, and Kassa shows the larger holding size of 0.79 ha. Majority of cocoa farmers in Tonyamang (60%) plants below 0.5 ha, while majority in Kassa (64%) does more than 0.5 ha. Most of the cocoa farms are owned by the farmers themselves and they usually cultivate in one location. Average distance from farmers' house to cocoa farms is in the range of 1 to 1.5 km.



Typical cocoa firm in Pinrang

Eighty percent of the farmers in Kassa have only cocoa farms, while 68% in Tonyamang has both cocoa and rice farms. In terms of household income from agriculture, cocoa contributes about 70% of total income in Kassa, while 25% in Tonyamang. Other income sources reported are trading, skilled labor and pension, and in Tonyamang a relatively high percentage of farmers (24%) are engaged in trading activity.

Population of cocoa plant averages to 407 trees per farmer with a plant density of 626 trees per ha based on average cocoa holding size of 0.65 ha. The corresponding figure for Tonyamang and Kassa is 619 and 625 trees per ha respectively, or about 60% of the recommended density. Average age of the plant stand in the survey area is over 18 years with marginally lower age for Tonyamang. The age class distribution reveals that no new planting has been made during the last 8 years, and that the average number of trees in peak production age of between 9 and 13 years is only 2% (none in Kassa and 4% in Tonyamang).

Lack of young plants and many aging plant together with the low plant density may result in drastic decline in the production volume in the coming years.

Some degree of diversification in the cocoa farms is observed in the survey villages. Twenty four percent of the farmers (32% in Kassa and 16% in Tonyamang) have introduced the short term crops including maize and banana, and perennial crops like mango and coconut to fill-up vacant space in once mono-cropped cocoa farms. The lower income from cocoa as a result of declining productivity and prices is cited as a main reason for such diversifications. The trend towards diversification is more obvious in Kassa where dependency on cocoa is greater, 220 ha has been brought under upland rice (70 ha) and corn (150 ha) to supplement the household income.

3.2.2 Cocoa production

It is of worth to be noted at first that cocoa farmers can be grouped into three categories, namely, i) cocoa farmers, ii) cocoa and paddy farmers and iii) absentee farmers. While farmers may or may not have non-farm income sources, cocoa contributes significantly to the household income of a typical cocoa farmer. In case of cocoa and paddy farmer, though the relative importance of cocoa in terms of income generation varies, the current tendency appears is to consider paddy as main and cocoa as secondary. In terms of the third category of absentee farmers, their cocoa farms are worked by hired labor. In this connection, the level of application of good farming practices by these three categories is likely to differ.

This section covers the cocoa farming activities by the smallholder farmers. Typical farming practices of cocoa in Pinrang District are analyzed as below.

(1) Planting materials

Seedlings are the main planting material used for establishment of cocoa. Budded and wedge / saddle grafted seedlings are also being tried out. Seeds from the mid section of the pods, which are harvested from mother plants and selected by the farmers themselves or with assistance of extension agents, are raised in black polythene sleeves. Seedlings in nursery are provided with shade and watered regularly, and are ready for field planting in about 3 to 4 months. Shade is gradually removed to the level expected in the field to harden the plants, few weeks prior to field planting.



Seedlings raised in nursery

Some farmers prefer to bud, or graft the seedlings with bud-wood from selected clones, and a few have established small scale commercial nurseries to sell the budded seedlings to other farmers. Both patch budding and wedge / saddle grafts are observed in the field, the former being the more common. Seedlings are ready for patch grafting in 8 to 10 weeks, and the bud patch taken from selected mother clones are inserted in a cut made at the base below the cotyledon scar.

The patch is covered with a transparent polythene strip and can be removed in two weeks if the patch takes hold. The shoot of the stock is removed to accelerate the patch bud to flush. If successful, the plants are ready for field planting in 5 to 6 months. The farmers in nurseries become quite skillful in raising bud and grafted material. The success rate of the former is stated as 80%. Seedlings are sold at Rp. 2,000 to 2,500 and the budded seedlings were sold at

Rp. 5,000 to 6,000, each in commercial nurseries managed by farmers' groups or individual farmers.

Limited supply of bud-wood originating from chupons has made it necessary to use material from fan branches. This practice changes the normal growth habit of cocoa plant. Unlike those raised from seedlings, those plants tend to be bushy with many bottom branches, requiring additional skill and care in formation pruning.

Dinas for Estate Corps (DISBUN) in Pinrang maintains four nurseries, where seedlings are raised from seeds released by Indonesian Coffee and Cocoa Research Institute (ICCRI) in East Java from its seed garden and seeds of selected mother plants in farmer's plantation. In 2006, 35,000 seedlings were distributed on a grant among farmers under Cocoa Rehabilitation Program conducted by DISBUN in Pinrang.

A special bud wood nursery of two ha is also maintained by a farmer in Pinrang, where some 2,000 mature cocoa plants are successfully side-grafted with 26 selected clones of local and Malaysian origins. The farm was established with the support of one graduate trainee from USAID's SUCCESS Project (see the later section). The farmer sells bud wood at Rp. 1,500 per insertion.

(2) Crop management

Fertilizing: A 1,000 kg of dry beans of cocoa removes approximately around 20 kg of N, 4 kg of P₂O₅ and 10 kg of K₂. If the pod husks are taken out from the field, the amount of potassium removed could increase by several times. Besides replenishment of the nutrients, application of fertilizer on a regular basis is crucial to maintain the unit yield of cocoa particularly in un-shaded stands, since the productive plant life is closely associated with nutrient availability. Furthermore, well fertilized plants can develop vigor and are less susceptible to pest and disease attack. Cocoa beans produced from fertilized plants can have the higher fat content. Recommendation of area specific fertilizer based on soil / leaf analysis and field trials are not available. A generalized guidance which DISBUN recommends is given below.

Table 8 General Recommendations for Cocoa Fertilizer Use (Unit: kg/tree/year)

Plant age (year)	N		P ₂ O ₅		K ₂ O		Magnesium	
	Urea	Amm. S	TSP	SP36	KCL	Kieserite	Dolomite	
0 - 1	25	66	25	32	20	20	30	
1 - 2	45	99	45	57	35	40	60	
2 - 3	90	198	90	115	70	60	90	
3 - 4	180	396	180	230	135	75	112	
4 onwards	220	484	180	230	170	115	172	

Source: DISBUN Technical Guidelines on Cocoa Farming 2002

It is recommended to apply fertilizers in split doses twice a year at the beginning and end of the rainy season. Immature plants require more frequent application. Fertilizer is desirably applied about 75 cm away from the base of the plant in a circle and worked into the depth of 5 to 10 cm.

According to the result of questionnaire survey, all farmers regularly fertilize cocoa plants. Twenty percent of the farmers apply NP&K, 30% for N&K, and the balance for N only. Dosages used in the two survey villages averages to 360g, 140g and 78g of N, TSP/SP36 and KCl per plant per year respectively. Sixty eight percent of the farmers practice a single

application per year, but 72% broadcast fertilizer around the base of the tree without working it into the soil.

Members of cocoa farmers' group which receives the revolving fund from DISBUN in Pinrang do apply fertilizers. But the discussion with visited farmers reveals that farmers who do not belong to such farmers' group do not fertilize cocoa plants due to difficulty in procurement, shortage of fund and aging of the plants. In the Cocoa Revitalization Program by DISBUN in Pinrang, the supply of fertilizers required for the first replanting year is granted to farmers. Use of organic manure and compost is a quite minimal.

Pests and diseases: Three major pests and diseases, that cause significant economic loss in cocoa pointed out by farmers, are summarized as below with the result of questionnaire survey. The other reported pests including stem borer, helopeltis spp., rodents and diseases like root disease and stem cancer are of less significant with incidence at below 10%.

Table 9 Infestation Intensity of Major Pests and Diseases (%)

Pest/Disease	2005			2006		
	T'yamang	Kassa	Average	T'yamang	Kassa	Average
Cocoa Pod Borer	48.8	53.2	51.4	54.6	59.2	56.6
Black pod	15.0	20.4	17.72	18.9	28.1	23.4
Vascular Streak Dieback	8.4	7.0	7.7	8.9	16.0	12.4

Source: The study team

Cocoa Pod Borer (CPB)
Conopomorpha
cramarella

Incidence of CPB was reported in Central Sulawesi in 1991, and it spread very rapidly to South and South East Sulawesi within the few years. A survey conducted in 2000 reveals that the average intensity of CPB infestation in South Sulawesi would be around 53% (150,000 ha) and average loss of crop would be around 24% (38,350 tons of dry beans).

USAID-funded program titled SUCCESS Project in partnership with Australian Center for International Agricultural Research (ACIAR) was implemented in Sulawesi from 2000 to 2003 to decrease the loss caused by CPB and dependency on pesticides use to control CPB. The technology package developed and disseminated among farmers consisted of four main activities: frequent harvesting, pruning, sanitation and fertilization (known by Indonesian acronym PsPSP), to which practice of Integrated Pest Management (IPM) was later added.



Cocoa beans damaged by CPB

According to questionnaire survey in Pinrang, almost all farmers (98%) report in 2006 that over 45% of the pods harvested are found damaged by CPB, while 86% of them report the same extent of damage in 2005. This implies a rise of infestation level. But, 76% of the farmers do not carry out any control measures. Twenty percent use pesticides and only 2% practices PsPSP.

Vascular-Streak Dieback (VSD)
Oncobasidium
theobromae

This disease has been spread by spores produced on the basidia which emerge from diseased branches. Spores are shed in the night and are carried by the wind, but exposure to ultraviolet light or desiccation quickly kills them.

The main approach to mitigate the disease include use of disease-free planting materials, cultural methods (complete canopy providing vigorous growth condition to affected mature trees), application of

fungicides, pruning in case of severe infection, and breeding and selection for genetic resistance in cultivars.

High incidence of VSD is reported in South Sulawesi, but data on degree of infection is not available. It is also difficult to assess the economic loss of yield caused by VSD, as other factors are frequently superimposed. Questionnaire survey shows that the incidence of disease is on the rise.

Black Pod (Pod Rot)
Phytophthora palmivora

Initial symptom is an appearance of small translucent spots on the pod surface. This spot soon turns to a chocolate brown color, then darkens and expands rapidly with a slightly irregular margin so that the whole surface of the pod is blackened. The pod infection can occur at any point on the pod surface and on a pod of any age.



Cocoa fruits infected by Pod Rot

The practices available for disease management include cultural practices, chemical control, integrated methods and breeding for resistance. As with VSD, the incidence by Black Pod has increased, particularly in Kassa.

Almost 95% of the farmers who use pesticides state that the choice of a particular chemical is based on their own field experience, and only about 12% of the farmers in Tonyamang seek advice from other farmers.

Weed control: Traditionally, young cocoa has been weeded by slashing along the tree rows and sometimes circle weeding around the plant. In a well maintained mature field, the actual need for weed control is minimal, as cocoa canopy minimizes the penetration of sunlight. This is further aided by the presence of shade trees. But, in most cases, some bare land patches due to death of some cocoa trees is unavoidable. Weed growth in such farms as well as in new or replanted ones should be controlled manually. If sufficient labor is not available, herbicide mixed with a pre-emergence herbicide can be applied.

In Pinrang, the cocoa farms in general are in a poor condition in terms of weed control. Most fields have vacant patches and are overrun with weeds. But the smallholders' farms in Noling in Luwu District, which are perhaps only a few years younger, are generally free of weeds with the cocoa inter-rows stacked with pruned branches. Use of total herbicides is also common for weeding, if the budget is available.

Cocoa is a surface feeder with most of its feeder roots branching off from the tap root. Unweeded farms therefore expose cocoa plants to competition with the weeds for nutrients, thereby affecting the productivity. When cocoa is planted under conditions which allow high weed growth (after clear felling), a special effort is needed to control weeds because of the higher sensitivity of immature plants to weed competition.

Shade: Young cocoa plants need some degree of shading in the nursery and also during the first 2 to 3 years in the farm. The shade is needed not only to reduce light intensity but also to buffer the micro-environment so that excessive moisture stress to the young plants is avoided. Although complete removal of shade gives rise to high yields, high yield without shade are difficult to maintain over the long time. Removal of shade shortens the economic life of trees considerably (sharp decline in yield), and shading is an effective means of controlling conditions of cocoa trees.

Attempts to increase yield by shade reduction therefore should be made gradually. Temporary shade in the early years (up to 3 to 4 years) can be provided by planting banana at the same spacing as cocoa. For permanent shade of cocoa, *Gliricidia* is most commonly used by farmers (92% of total) in the survey villages, followed by *Leucaena* (8%) during the early growth period. However, most farmers have already removed the shade and turned into monoculture farms.

Short-term crops, such as corn and banana, are also planted to provide shade before or soon after the cocoa seedlings are planted. However, the shade provided by these crops is only temporary and permanent shade trees must be established. It is observed that the one year old cocoa farm in Noling and the farm prepared for re-plantation at Pinrang have not been provided with adequate shade condition. In both farms, cocoa plants are inter-planted with short term cash crops such as chili and maize.

Pruning: Pruning of cocoa trees is an essential practice, which is undertaken at different growth stages and can be treated under i) formation pruning, ii) structural pruning, iii) production pruning and iv) sanitary pruning. The objective of formation pruning is to adopt natural growth habit so as to develop a good frame for the young plant. Formation pruning ensures that the trees would yield well while allowing easy access to carry out harvesting and farm maintenance. It involves removal of basal chupons at regular intervals, and removal of low branches to make the whole tree accessible with a canopy.

Structural pruning of young and mature trees is necessary to maintain shape or frame with a proper balance of the branches and achieve the ideal umbrella-shaped canopy, which allows good orientation of leaves. Production pruning is performed to promote bloom formation of cocoa plants once or twice a month, depending on rains. Sanitary pruning is practiced to maintain the healthy situation of plant environment so as to avoid the spread of pest or disease, and to remove unnecessary chupons, dead branches, deceased and damaged pods.

The questionnaire survey at the two villages shows high degree of awareness and understanding of types of pruning, although the field application is somewhat lower. As for the frequency of pruning, nearly 50% of farmers who practice structural pruning did so twice a year, while 28% prune once a year. Sixty eight percent of them practicing production pruning does so twice a year while 16% prune only once a year.

Table 10 Awareness and Practice of Pruning (%)

Type of Pruning	Status	Tonyamang	Kessa	Average
Formation	Awareness	96	96	96
	Practiced	84	88	86
Structural	Awareness	92	100	96
	Practiced	72	76	74
Production	Awareness	100	96	98
	Practiced	80	88	84

Source: The study team

It is apparent in the visited villages in Pinrang and Luwu that formation pruning has been done on the existing cocoa trees. However, there are areas, particularly in Pinrang, where structural pruning is not practiced causing several canopies of fan branches jorquetting from successive chupons. This makes it not only difficult to harvest pods on upper canopies, but

make them smaller in size with the higher bean count. Further, sanitary pruning too has been hardly done, with plants having dead wood and deceased pods still left to the trees.

Harvesting: Harvesting period for cocoa is closely related to the rainfall pattern. In some areas, harvesting is a year round with a seasonal peak. But in other area such as Pinrang, where dry spells is experienced, there is no harvest period for one or two months. Frequent harvesting is recommended as a means to minimize the loss from CPB infestation. The appropriate time for harvesting pods is indicated by the change in color of pods. Research shows that a significant reduction in loss by CPB is possible by harvesting at weekly interval when the pods are partially yellow or show signs of pest attack.

In the survey villages, many plants have damaged pod bases or flower cushions caused by incorrect harvesting practices adopted in the early years of production. It is observed that 42% of the farmers do not use sharp tools to pick the pods. In many instances, lack of structural pruning makes harvesting difficult and causes plants to grow unchecked for fruiting pods at the upper branches.

Although the harvested pods can be stored for several days without loss of quality under normal circumstances, they need to be opened and seeds removed as early as possible. Also the husks need to be buried soon to minimize further loss, caused by a spread of CPB. A difficulty faced by the farmers in frequent harvesting (say, one week interval against the prevailing fortnightly or monthly interval) is a shortage of labor for harvesting and the following post harvest operation.

3.2.3 Re-plantation and rehabilitation

The crop can be established as a new plantation, re-plantation or rehabilitation. Re-plantation involves replacement cocoa farms with young cocoa trees, and commences with the removal of old stand of cocoa trees, followed by clearance of weeding.

The field is desirably staked at 3 x 3 m, and the planting holes of 25 x 25 x 25 cm are dug to sufficiently accommodate the root system of the seedlings. At this spacing, 1,100 plants can be planted in one hectare. Visited farmers in Pinrang observe that the plant spacing is too close as it would require heavier pruning in the later years. DISBUN recommends a planting hole of 40 x 40 x 40 cm dug out 3 months prior to planting the seedlings and filling of the hole with a mixture of compost or manure.

Besides complete re-plantation discussed in crop establishment, few other methods have been developed. These are i) partial replanting method, ii) phased replanting method, and iii) turrialba method (planting under old cocoa trees).

Rehabilitation refers to the process of restoring yield by cultivation and management of the existing mature trees. For rehabilitation, three methods can be recognized, namely, i) rehabilitation of moribund trees, ii) chupon re-growth method and iii) side grafting method. Chupon re-growth and side-grafting methods demonstrated in Pinrang and Luwu show



Chupon growing from adult tree



Rehabilitated by side grafting

much promise as viable solution to revitalize cocoa plantations. For rehabilitation to be successful, both methods require the plants to have a healthy root system. Side-grafts bear fruits quite early and the first harvest could be made within 2 years, while chupon re-growth follows the normal growth habit of the plant taking 3 to 4 years to yield.

Since availability of additional new land and budget to buy seedlings for the smallholder farmers are limited, newly development and re-plantation have been rarely seen in South Sulawesi and the visited villages in Pinrang and Luwu. Rehabilitation on the other hand is the prevailing practice.

The questionnaire survey reveals that over 60% of the farmers are engaged in rehabilitation of their plantations. Main reason for not undertaking rehabilitation is because the plants are too old and the farms are virtually abandoned. Most popular rehabilitation method used by the farmers is side-grafting, which 54% of the farmers in the survey villages adopt. The success rate of side-grafting is around 30 to 40%, but the responded farmers are confident that it would improve as they gain more experience. Re-plantation to replace dead and old trees is also practiced on a very limited scale (8%), while other methods like chupon re-growth have not been attempted.

GOI presently undertakes a nation-wide initiative “Cocoa Revitalization Program” for re-plantation and rehabilitation of the aging plantations, and scheduled to cover 300,000 ha in 2007. Under the program in Pinrang, DISBUN re-plants and rehabilitates 50 ha of the farmers’ group (Cambanua) in Kassa. A combination of methods is applied where farmers have cut down 50% of the trees for re-plantation (partial re-planting method) and the remaining has been side-grafted to maintain some extents of production. In addition to seedlings, other planting inputs such as fertilizer and chainsaws have been granted to the farmers by DISBUN under the program.



Area cleared for re-planting

In extending the program, DISBUN should focus on strengthening of its facilitation service and technical guidance. In the re-planted area under the program, the lack of appropriate technical guidance on planting method and use of planting inputs is apparent. For example, the aged cocoa trees are cut down leaving stump with roots, causing the spread of disease in re-planted young trees and affecting their growth and productivity.

Assisted under the same program, a pilot scheme has been launched in Kassa, where migrant workers from other districts are deployed for felling and clearing old cocoa trees. But they are compensated by allowing them to grow corn over three seasons. During the third season, inter-row planting of cocoa seedlings and taking over of farm management is scheduled. The system has been adopted by the other neighboring farmers as well, and about 100 migrant workers are deployed for this activity.



Farm family engaged in pod opening and seed removal

3.2.4 Post harvest operation

The sequence of post harvest operations can follow pod sorting, pod cracking, bean sorting, fermenting and drying.

(1) Pod sorting and cracking

None of the farmers in the survey villages sort the harvested pods to separate them according to size, ripeness or damages. The pods heaped-up in the field after picking are cracked open immediately using knives and the wet beans are carried to homes.

(2) Bean sorting and grading

Limited farmers (12%) remove waste materials from beans, even though they believe it would improve the quality (33%) and therefore the price (67%). Farmers who do not separate the waste materials (88%) are of the opinion that it would have no effect on the price. Farmers who grade their beans (10%) state that they get the better price than selling in un-graded form. Those who do not grade the beans (90%) state that the price differential is insignificant or that there is a loss in the bean weight.

(3) Fermentation

Nearly all of the cocoas in Sulawesi are produced as unfermented. Attempts were made in the 1980's to carry out fermentation of wet beans on the farmers' own initiative, based on their experiences in Malaysia where many previously worked for as cocoa farm workers. The older farmers recall that wooden sweat boxes were used for the fermentation process. However, with the increase of individual income realized by the peak productivity, high bean price and demand, the low price difference offered by buyers for fermented beans has given little incentive for farmers to adopt costly and labor intensive practice of fermentation.

In the survey villages, no one practice fermentation, 88% of the farmers state that the price difference offered by buyers is insufficient to carry out fermentation, while 12% mention that they need immediate cash. About 70% of the farmers expect a minimum difference of Rp. 1,000 per kg, while others are satisfied with Rp. 500 per kg.

But, there is a fresh initiative to produce fermented beans mainly to cater for the local processing industry. In Pattedong village in Luwu, one cooperative Bina Harappan was granted with fermentation equipment (two-step wooden box) under the industrial cluster development program by the local government, and has started fermentation of beans directly shipped to the local processor (PT. Bumi Tangerang in Banten) through the buying agreement. In the cooperative, some portions of collected beans from member farmers are fermented over five days in return for price differential of Rp. 2,000 per kg.



Fermentation boxes granted by local government

(4) Drying

Cocoa beans are dried in the sun to reduce the water content ideally to 7%. For this purpose, the wet beans extracted from pods are spread on cement floor or on plastic mats exposed to direct sunlight. Majority (92%) of the farmers in the survey villages use plastic mats to dry beans, and some 6% use cement floors when they do drying. Beans are dried for 2 to 5 days. Unlike in fermented beans, where the germ can be killed by acids, germ of un-fermented ones is killed by heating beans in sun. The process does not allow development of flavor.

Farmers tend to sell the beans in wet or no sooner the beans attain a slight dryness in order to gain from the higher bean weight. In general, farmers' income from cocoa is more regular

compared to paddy or other crops, and used mostly to cover daily expenses. Under such a condition, there is hardly any storage of cocoa at the farm level.

Table 11 Bean Drying, Cleaning and Grading (%)

Activity		Status	Tonyamang	Kessa	Average
Drying	Method	Sun drying	100	96	98
		Artificial drying	0	0	0
	Surface	Plastic mat	92	92	92
		Cement floor	8	4	6
		Bamboo mats	0	4	2
	Duration	2 to 3 days	56	40	48
		4 to 5 days	44	60	52
Waste Removal			16	8	12
Bean Grading			12	8	10

Source: The study team

The above mentioned cooperative Bina Harappan was also granted gas-burning drier machine under the same industrial cluster program. The drier appears to have not been used much. All members of cooperative have free access to the equipment, and the users are requested to arrange labor and fuel. A visual assessment of samples of fermented and dry beans produced by the cooperative indicates that quality can be improved more.



A farmer drying beans just one day after the harvest

One visited farmers' group in Pinrang is provided with a sophisticated electric drier. But this drier has not been operated. A concrete drying floor too has been laid in its premise. These drying facilities were granted to the farmers' group under the industrial cluster program.

(5) Production and yield

Production and yield of cocoa are usually expressed as the weight of dry beans per unit area. Figures reported by DISBUN in Pinrang for year of 2005 are shown below. The value on production and yield at 1.57 tons per ha appears very high.

Table 12 Cocoa Production and Yield (in Dry Bean) in Pinrang in 2005

Sub-district	Total cocoa area (ha)	Productive area (ha)	Productive area (%)	Production (ton)	Yield (ton/ha)
Lambang	7,326	5,419	74	8,546	1.58
Batulappa	3,930	2,879	73	4,454	1.58
Duampanua	2,510	1,757	70	2,753	1.57
Patampanua	2,380	1,662	70	2,609	1.57
Paleteang	1,441	1,081	75	1,692	1.56
Tiroang	1,414	1,060	75	1,659	1.56
Mattiro Balu	1,040	778	75	1,221	1.57
Cempa	579	433	75	660	1.52
Lasinrang	554	412	74	686	1.66
Suppa	283	210	74	332	1.58
Mattirosompe	249	183	73	287	1.57
Watang Sawitto	199	149	75	234	1.57
Total Pinrang	21,905	16,023	73	25,133	1.57

Source: DISBUN Pinrang

Unit yields responded by the farmers in the survey villages in the district range between 0.15 and 0.51 tons per ha only, with a mean yield of 0.28 tons per ha. Yield distribution among

the farmers in the survey villages is shown below. Given the plantation conditions and crop management performance in the survey villages, the yield level stated by the responded farmers appears more realistic.

Table 13 Yield Distribution among Farmers (%)

Yield (kg/ha)	Tonyamang	Kassa	Average
< 100	0	0	0
100 - 200	16	20	18
201 - 300	40	48	44
301 - 400	32	24	28
401 - 500	8	8	8
> 500	4	1	2
Average	299	266	283

Source: The study team

3.3 Farmers' Organization

3.3.1 Rationale and performance of farmers' organization

(1) Rationale of farmers' organization

A need for proactively utilize the merits of farmers' organization is apparent in the cocoa sector of Sulawesi, where the smallholder farmers play a vital role in farming and some degree of post harvest operation. Adequate utilization of farmers' organization can lead to effective and efficient dissemination of improved farming practice and allocation of farmers' resource, more active farmer's participation into the supply chain, improved accessibility to financial institutions, and building of bargaining power to demand for the better infrastructure.

(2) Present performance of farmers' organizations (in the survey villages)

As with other crops, farmers' group (Kelompok Tani) has been formed as a unit to receive public extension service since 1980s in cocoa sector of Sulawesi. In Pinrang District, there are around 170 of cocoa farmers' groups registered under DISBUN, of which only tens are said to be active at present. The number has decreased due to the lesser farmers' interest in collective activity. Cocoa farming (and some degree of post-harvest operation) in Pinrang and South Sulawesi is mostly dealt with by individuals.

Besides cocoa farmers' group, a few cooperatives concerning cocoa farming registered under Dinas for Industry, Cooperatives and SMEs (DISPERINDAG) exist, but they are originated from cocoa farmers' group and later on formed to particularly receive the fund (loan) from the district government.

Table 14 Number of farmers' group in Pinrang District

Number of farmer groups (No.)	170
Number of members (No.)	4,473
Area under farmer groups (ha)	4,203
Number of cocoa growers (No.)	24,646
Total cultivated area (ha)	21,905

Source: DISBUN, Pinrang District

Farmers' awareness and expectation to collective action is surveyed. Result of survey reveals that some 56% of the farmers show a positive opinion for collective action particularly in post harvest activities, but that 32% have a negative and 12% with no opinion. Farmers of positive opinion, 11% of them raise the bargaining power they hold as a merit of collective action, but the rest of 89% are not able to points out the merits in cocoa farming and post-harvest operation. Farmers of negative

opinion indicate a difficulty in handling large quantities of beans. But in general, farmers here have a sense of joint-work (called as “*Kombong*”³ in Buginese).

3.3.2 Supporting programs for farmers’ organization

As mentioned, farmers’ group has been organized under DISBUN for its efficiency of support program and extension service. In Pinrang, eight officers are expected to support and guide farmers’ groups. Although DISBUN implements some kinds of support program for farmers’ organization such as provision of revolving fund and plant materials, technical guidance to be followed is weak. Routine extension activity is to be rendered in practice by Agricultural Information and Training Agency (BIPP).

BIPP in Pinrang holds 11 extension staff for estate crops out of 140 extension staff in total, and they are stationed at each sub-district office (BPP). However, the dedication and capability to provide quality service is weak due to the limited number of staff who has adequate training in cocoa plantation. And, the presence of BIPP at cocoa farm is hardly recognized by farmers, if compared to DISBUN staff.

Such a weak capacity in public extension (or facilitation) service for cocoa farmers has motivated donors to directly intervene in empowerment of farmers’ organization. Major programs of such include Cocoa Village Model (CVM), Pest Reduction Integrated Management (PRIMA), Sustainable Cocoa Enterprise Solutions for Smallholders (SUCCESS) and the following SUCCESS Alliance, and Agribusiness Linkage component in the Program for Eastern Indonesia SME Assistance (PENSA). In addition, PT. Effem and ASKINDO have trained over tens of their own field facilitators. In particular, PT Effem has established eleven in-country buying stations where field facilitators are stationed to render technical guidance on good farming practices through several farmers’ group in each station.

Concerning the strengthening of farmers’ organization itself, SUCCESS Alliance and PRIMA Projects are of attention. SUCCESS Alliance facilitated to form and strengthened the functions of around 30 farmers’ groups. PRIMA also helped empowering farmers’ groups through strengthening their marketing function at the beginning. Both are said to achieve a certain outcomes, but the latter appears more effective in a sense that it helped to create direct connection between farmers’ groups and buyers. This approach has been taken over by PENSA by IFC.

Table 15 Support Program for Farmers’ organization

Program	Period/Place	Key features related to farmers’ organization
Program by DISBUN	On-going / Pinrang	<ul style="list-style-type: none"> · Seedling provision to farmers (35,000 seedlings from four nursery) · Group empowerment through provision of revolving fund (20 million per each of ten farmer groups in 2006) · Cocoa Rehabilitation Program to the selected farmers’ groups, through provision of seedlings and related materials
Cocoa Village Model (CVM) by ASKINDO	2003 - / Mamuju	<ul style="list-style-type: none"> · Community development initiative based on cocoa farm improvement · Strengthening of expected functions of farmers’ group to facilitate collective work · Facilitating direct linkage with buyers to improve quality · Three field facilitators of ASKINDO are assigned on full-time basis

³ “Kombong” means “to gather” in Buginese. It has been practiced by farmers for many generations and important part of their life. Some numbers of farmers form informal group, where they share the labor to complete certain works

Program	Period/Place	Key features related to farmers' organization
Sustainable Cocoa Enterprise Solutions for Smallholders (SUCCESS) Project, SUCCESS Alliance by USAID	2000-2005 / Sulawesi	<ul style="list-style-type: none"> Conducted for development and dissemination of good farming practices to control CPB through Farmers Field School (FFS). SUCCESS Alliance conducts the program to support farmers' group formation and capacity building, including training on organizational / financial management, business planning, and marketing Targeted for the self-organized groups during FFS training 31 groups with 1,126 farmers are formed and strengthened
Pest Reduction Integrated Management (PRIMA) Project by PT Effem	2003-2005 / Luwu	<ul style="list-style-type: none"> Targeted for 742 farmers Encouraged farmers' group to start direct deals of beans with PT. Effem (processing company) Training on bookkeeping, financial management, quality control Intensive facilitation service during the course of project
Program for Eastern Indonesia SME Assistance (PENSA) by IFC	2006 / Sulawesi	<ul style="list-style-type: none"> Farmer empowerment and farmer group strengthening program, including sub-component of business skill training, access improvement to finance and farming inputs, market info., and improvement of post harvest operation.

Source: Compiled from an interview to DISBUN, reports of IFC-PENSA and USAID SUCCESS Project

3.3.3 Case study of farmers' organization

Among ten farmers' group which are active at present, interview survey was made to two farmers' groups to grasp the current situation and performance of collective action. Three farmers' organizations in Luwu were also interviewed for comparison and to find the performance in more intensified cocoa farming area. Features of each organization are explained below.

Table 16 Features by Visited Farmers' group (and Cooperative)

Name of organization	Mattiroadada (farmers' group)	Buan Kakao (farmers' group)	Permata Coklat Almanar (FG)	Siprennu (farmers' group)	Bina Harappan (Cooperative)
District	<u>Pinrang</u>	<u>Pinrang</u>	Luwu	Luwu	Luwu
Registration	DISBUN	DISBUN	DISBUN	DISBUN	DISPERINDAG
No. of member (female)	25 (10)	25 (10)	23 (3)	60 (10)	80 (10)
Establishment facilitated by	SUCCESS	SUCCESS	PRIMA	PRIMA	UNHAS expert
Technical & financial supports	Training (SUCCESS) Grant Rp.500,000 (DISBUN) Loan Rp.20 mil. (DISBUN)	Training (SUCCESS) Grant: fertilizer 3 tons (DISBUN)	Training (PRIMA) (SUCCESS) (PENSA) Loan Rp.20 mil. (DISBUN)	Training (PRIMA) (SUCCESS) (PENSA)	Training (SUCCESS) Loan Rp.20 million (Koperasi) Consultation (UNHAS)
Main activity	- Procurement and marketing of input - Short term loan to member	- Occasional labor sharing among member	- Selling seedling - Procurement and marketing of input - Marketing of beans - Short term loan to member	- Occasional labor sharing among member - Marketing of beans - Short term loan to member	- Retail shop - Banking (saving & credit service to member) - Marketing of beans - Production of fermented beans

Source: The study team

In general, formation of the presently active farmers' organizations has been triggered by donor-assisted programs like SUCCESS Alliance and PRIMA. Number of active members in farmers' organization amounts around 25, except for those in Luwu. One farmers' group in

Pinrang admits that they do not want to increase the number beyond 25, since amount of revolving fund awarded by DISBUN is insufficient to cover additional members.

Concerning the activity, collective action is observed in purchasing of plantation inputs, marketing of beans, credit provision, labor sharing and some degree of post-harvest operation such as fermentation. Most likely action, collective marketing of beans, is commonly observed at site particularly in Luwu, and this appears to give rise to other collective actions, while collective action in Pinrang is quite limited. Institutional linkage map is prepared for one farmers' group in Pinrang and one cooperative in Luwu as below, showing which stakeholders are related with farmers' organization in which degree.

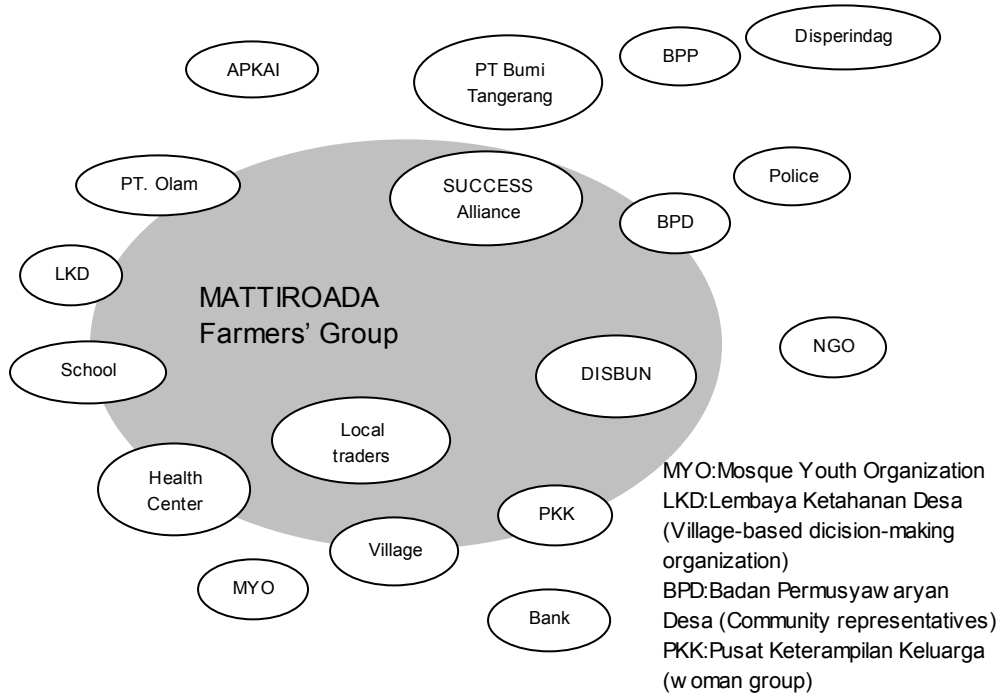


Figure 18. Institutional linkage of Mattiroadada farmers' group, Pinrang District



Figure 19. Institutional linkage of Bina Harappan cooperative, Luwu District

Farmers' group in Pinrang have a close interaction with DISBUN, SUCCESS Alliance (though already completed). It is understood that those institutions have more frequently or effectively rendered financial support to farmers' organization. Local traders are followed and also located close.

Cooperative in Luwu has also close interaction with SUCCESS Alliance, donor-assisted program. It has close relationship with local trader, and processor / exporter also exist close, indicating that this cooperative has direct deals of beans with them. Distributor of inputs like fertilizer is also located close, indicating collective purchase of fertilizers through cooperative. On the other hand, farmers' group in Pinrang have less interaction with private sector except for local trader, as members are primarily concerned with individual premise of farming.

The following points are identified from the case study of selected farmers' organizations.

- **Degree of collective actions by farmers' group is largely influenced by degree of facilitation.** Farmers' organizations in Luwu appear to be more active than those in Pinrang, practicing the wider ranges of collective actions. In Luwu, all three farmers' organizations are covered by facilitation network of PT. Effem and the on-going PENZA's farmers' empowerment, where field facilitators continuously contact the groups, advice and support them in solving problems. Cooperative in Luwu is also supported by one expert of cocoa in University of Hasanuddin (UNHAS).

In Pinrang, on the other hand, collective actions are quite limited and capability to manage organization appears to be weak, although DISBUN has an on-going interaction with them through revolving fund monitoring. These farmers' groups were formed through facilitation by donor-assisted programs, but these programs are already completed. Successful farmers' organizations can have continuous communication with quality facilitation service.

- **Direct deals with buyers contribute to empowerment of farmers' group.** For active farmers' organizations in Luwu, a processor (PT Effem) through its field facilitator has encouraged collective marketing to directly purchase beans, provided that beans are met with quality standard. On the other hand, farmers' groups in Pinrang do not see such interactions with up-stream buyers. Particular activity which may bring returns for farmers will be key starting point to strengthen farmers' organization and its collective action.

3.4 Off Farm Activity (South Sulawesi)

Off farm activity mainly focus on beans trading and processing. Bean trading includes collection, local trade and export of beans.

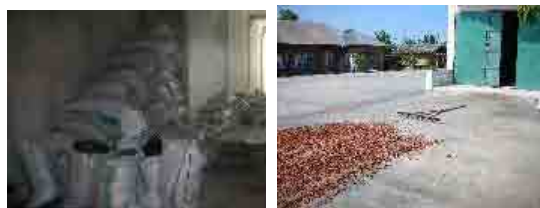
3.4.1 Collection and trading

The first link in the supply chain is the transaction between farmers and collectors. Collectors are very close to farmers, or farmers themselves, and make a routine visits to cocoa farms, and transport beans to traders or town markets. Farmers usually sell beans in a still wet condition (soon after harvesting or drying to the limited extent) together with waste matters

without proper grading. The farm-gate prices are determined based on collector's visual assessment on moisture level and amount of waste matter. Since the number of collector is many, farmers in general have the option to select them based on the price offered, unless farmers are in debt to collectors.

Although the access to price information by farmers is considered readily available, the questionnaire survey at two survey villages reveals that most are not fully aware of the daily price. But active farmers are better informed through mass media, local traders and others farmers via mobile phone.

Traders usually purchase beans from collectors and to a lesser extent from farmers and town markets. They usually operate with collectors' network. Traders in many cases own warehouses, drying floors, sorting machines and trucks. Collected



Trader's warehouse (left) and drying floor (right) in Luwu

beans are to be sun-dried if supplied in wet condition to the desirable moisture level and passed through sorting machine. It is usual for traders to carry out grading (sorting beans from good to waste, broken, poor ones) before delivering beans to their buyers (exporters or processors). Traders often follow their own system of grading based on quality requirements of the particular buyer and the prices offered. But there are few traders who can prepare beans in "ready-to-export" condition. Traders usually deliver the beans to buyers' warehouses.

As mentioned, transaction of cocoa beans at domestic level is based on "cash and carry". Intermediaries (collectors and traders) usually rely on advance from their buyers to finance these frequent purchases. Such advances, whether in cash or in-kind, are one of the main tools to leverage the buying volume. However, intermediaries who depend on advances, have tendency to be captive, and interested not in quality. Smallholder farmers also tend to deal with those who buy their beans soon after harvest for immediate cash needs.

In addition to collectors, who deal with the majority of beans produced, alternative markets like weekly market at town center are used by farmers who stay close to town center. Some traders use such town markets as collection points. Since a certain degree of intermediary service is not required in this case, the farmers may obtain the higher price than at the farm-gate.

Widely known as low quality bulk beans, trade of Sulawesi beans has been driven by volume-based deals, not quality-based one. This often makes intermediaries mix good beans with bad ones and wastes as a practice to merely gain the volume and their revenue, and may incur considerable cost of grading to exporters and processors. It is difficult to discourage such practices, unless adequate commercial incentive is given from the later stage participants of supply chain.

Under such a circumstance, an introduction of bean standard coupled with commercial incentive at the farm level may be a possible solution. But, the quantity of beans sold by an individual farmer is quite small, and the benefit derived from additional work for bean preparation is insufficient for individual farmers. This issue may be overcome to some extent,

if farmers utilize the existing farmers' organization to take collective actions. Farmers' organization can also interact directly with exporters and local processors to become familiar with their requested quality standard for proper bean preparation, and can supply beans directly to those buyers with premium payment. This may also lead to reduction of cost for bean preparation to some extent at the buyers' side.

3.4.2 Exporting

Almost 90% of the beans produced in Sulawesi are purchased by bean exporters, 80% of which is handled by the affiliates of multinationals (such as EDF&Man, Olam, Cargill, ADM, ARMAJARO, and Continaf) in Makassar. They purchase bulk beans mainly from local traders and to a lesser extent from the collectors and farmers' groups directly (provided that quality of beans is met with their standard). Major portion of beans purchased are delivered to the network of multinationals, while a lesser quantity is exported to integrated manufacturers for processing and manufacturing. Their buyers (importers) are primarily located in Malaysia, USA, Singapore, and Brazil.

The balance of 20% is purchased by 20 to 30 local exporters. Local exporters (usually small scale) are largely located in Makassar and Palu, and buy beans from traders who deliver their warehouses. They sell beans through agents to users for processing in the region or directly to Asian and multinational processors and manufactures to the lesser extent. Local exporters with the smaller working capital have increasingly found it difficult to compete with affiliates of multinationals, and resorted to selling beans to the competing multinational affiliates.

Volume-based transaction prevailing in the trade of Sulawesi beans, has necessitated exporters (local processors, too) to take care of drying and grading to prepare beans for "ready to export" condition. This may incur considerable cost to exporters since the amount of beans at their premise is a quite large. Careful exporters offer discount prices depending upon the degree of variability in bean quality, and have begun selecting reliable supplier of beans.

The biggest concern felt by exporters for Sulawesi cocoa is apparently decline in productivity and decreasing supply of good beans. This may affect exporters' behavior. In this regard, "commitment-based" buying agreement (as means to assure consistent supply with a certain quality standard and to motivate farmers to improve farming and post-harvest practices) with farmers has been limited practice so far. Only a few processors and affiliates of multinationals have started to engage a "memorandum-based" direct purchase from farmers in view of stable supply of quality beans.

A few exporters in Makassar start networking with NGOs to assure good beans through assigning them to socialize good farming and harvesting practices to farmers' groups. Motivation among the exporters (multinationals' affiliates in particular) to place their operation near production area (through upcountry buying station, for example) exists to cut the issues at the early stage of supply chain.

3.4.3 Local processing

Processing of cocoa beans involves several stages to obtain cocoa products including cocoa paste (liquor), butter and powder / cake, then which are used by manufactures of chocolate

and other related products. The consistency of quality is a predominant requirement for successful marketing of cocoa products. Processing of cocoa is briefly described below;

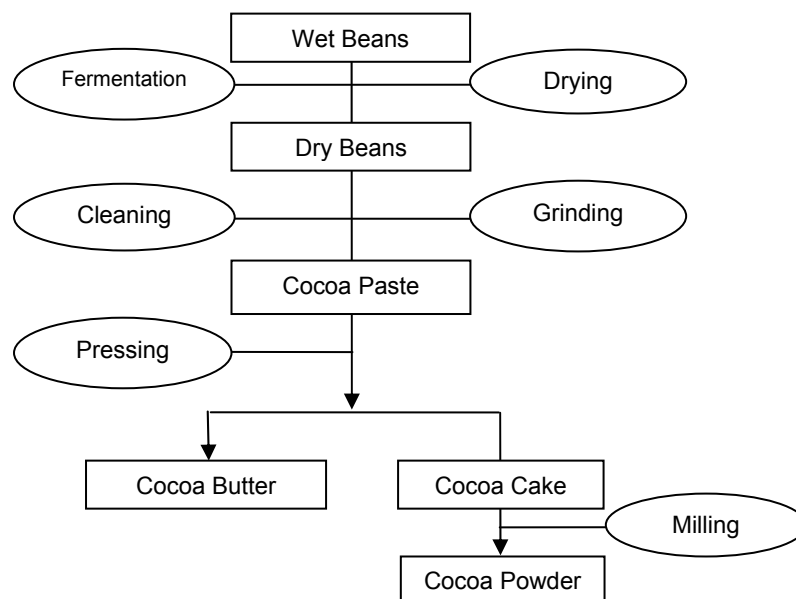


Figure 20 Floor Diagram of Cocoa Processing

As stated, there are tens or more processing plants in Indonesia. Five plants out of these plants are located at KIMA in Makassar (and one in Kendari of Southeast Sulawesi). Other plants are located in Java (Surabaya, Jakarta, Bandung, Banten). Installed processing capacity is estimated to 283 thousand tons in Indonesia, and 68 thousand tons in Makassar. But over half of processors, mostly located in Java, are either non-operation or operating far below capacity.

Table 17 Cocoa Processors in Sulawesi

Name of Processor	Location	Annual capacity (tons)			Operational status
		2003	2004	2005	
PT. Kopi Jaya Kakao	Makassar	-	-	10,000	Not yet started
PT. Maju Bersama	Makassar	-	22,000	25,000	New plant, but 2 out of 3 shifts
PT. Effem Indonesia	Makassar	17,000	17,000	17,000	All shifts
PT. Unicom Makassar	Makassar	10,000	10,000	10,000	-
PT. Poleco Cocoa Industry	Makassar	6,000	6,000	6,000	-
PT. Industri Kakao Ultima	Kendari	-	-	25,000	Not yet started

Source: Indonesian Cocoa Commission

Domestic processors can be grouped into two types. Ones operate plants mainly for their world-wide group companies. Others are “Indonesians”, which sell their cocoa products not only for individual export market but also domestic one (a few large confectionary manufacturers such as the Ceres, and small ones for chocolate product and drink, bakery, biscuit, ice cream).

According to estimates from various sources, Indonesian processors grind only 120 thousand tons of cocoa beans in the latest year (against over 280 thousand tons of installed capacity), and rely on beans supplied from Sulawesi, other regions (Sumatra, Java, Papua) and imports. Since Indonesia currently imports more than 30 thousand tons of cocoa beans for processing,

around 90 thousand tons of domestic bean production is being locally processed. Makassar traders roughly estimate that approximately 10% of Sulawesi bean production (approximately 35 thousand tons) is processed domestically.

Establishment and present performance of visited local processors	
PT Effem	Owned by Masterfoods Inc., and located in KIMA, it has annual installed capacity of 17,000 tons, but now grinds less than 12,000 tons per year, mainly due to inconsistent supply of good beans. Beans are sourced mainly from Sulawesi but some from surrounding islands. Main products are butter and low fat powder. Powder is shipped as natural or alkalized. Products are largely exported to Masterfoods' factories located globally. Effem actively involves in donor-assisted programs, and by itself stations field facilitators (now twelve) in South Sulawesi to assist farmers for good farming practices and plant regeneration to assure consistent supply of good beans.
PT Maju Bersama Cocoa Industries	Located in KIMA, it has annual installed capacity of 25,000 tons, but presently operates two shifts out of possible three. Prompted by the incentives (such as tax exemptions) offered to local industry, the investment was made and the plant commenced operations in 2005. Main products are paste, butter and cake. Maju Bersama recognizes that there has been an increasing demand for butter and paste in USA and Europe but the prices offered by buyers there are lower than expected. All production of cake is sold to the local manufactures.
PT. Bumi Tangerang Mesindotama (BT Cocoa)	Located in Banten and established in 1983, it has annual installed capacity of 40,000 tons, and becomes the third largest processors. Products include butter, paste and powder, exported to USA, Europe, Asia, Middle-east, Australia, Russia. Now targeting China, it has 3 marketing offices in China. Beans are now sourced from Sulawesi, Bali and Lampung through the buying stations. Bumi adopts a price differential for fermented beans, where the beans are purchased directly from farmers' organization at the higher price.

Main issue that domestic processors face is decreasing supply of good beans, marked with the lower fat yield of beans. This leads many local processors to halting operation or operating at far below capacity. Fierce competition among cocoa bean exporters to secure consistent supply of good beans has also complicated supply conditions faced by local processors, and beans are increasingly directed to exports by the multinational traders, being partly triggered by the expansion of Malaysian processing industries.

In addition to the above issues, lack of sizable markets for cocoa cake / powder is another reason of operation at the below capacity. An imposition of value added-tax (VAT) for agro-material use has also squeezed processor's cash flow and discouraged traders from supplying to processors (this VAT is already suspended).

To assure consistent supply of good beans, for instances, PT. Effem (processors) commenced up-country buying station which provide its field facilitator support to some 1,000 ha of smallholders' plantations in Luwu. In parallel to continuous facilitation support at site, Effem purchases wet beans directly from supported farmers' groups, provided that quality of beans

is met with its standard. Effem establishes another ten of upcountry station which has similar functions throughout South and Central Sulawesi.

Local processors are potential buyer for the fermented beans, which are not demanded by the world market for Sulawesi beans. Fermentation at post harvest helps processors to process beans more efficiently (avoiding machinery for winnowing and pressing from being clogged and halted for cleaning as a result of use of unfermented beans) and extracts more flavor that is important for cocoa liquor and powder / cake. Visited processors state that price incentives can be given for fermented beans as long as the quality of beans is met to their requirements.

PT. Bumi Tangerang in Jakarta, with the assistance of DISBUN, has started direct purchase of fermented beans from South Sulawesi, where an incentive of 20% premium is offered to farmers' cooperative Bina Harappan in Luwu in return for supply of fermented beans with required quality. Before this scheme was started, the processor conducted training for participating farmers on proper fermentation, drying skill, and quality control by its own cost. Under this scheme, farmers' cooperative is expected to supply 15MT per one shipment, but has not been able to fill this volume regularly.

The Government of Indonesia (GOI) now seeks for measures to vitalize the processing industries through an abolishment of VAT which agro-processors have to bear for agro-material use (but not yet finally approved), and introduction of bean export tax which imposes 5% of the value for exporters (under discussion, but ASKINDO is at the position for opposition). Removal of import duty for cocoa products in China expected after 2007 under EHP will be also factor to drive processing industry in Indonesia.

There is one fresh initiative of investment for cocoa processing in Southeast Sulawesi. This is small-scale processing plant under preparation by the Cocoa Farmers Association (APKAI), which is supported by one large local processor. One private bank has already promised to finance this plant. Though further details are not known yet, but the initiative can be model for promotion of local processing industry in region.

3.5 Supporting Stakeholders and Framework

3.5.1 Supporting stakeholders

Responding to decline of productivity and decreasing supply of good beans, primarily caused by the spread of pest infections like CPB, cocoa sector South Sulawesi (and Sulawesi as a whole) has been surrounded by many supporting stakeholders. Supporting stakeholders' concerns concentrate on production (farming and post-harvest practices, farmers' organization, access to finance) and R&D (variety improvement, plantation technology). Supporting stakeholders range from the private sector, academic and R&D institutions, financial institutions, local government, and multi- and bi-lateral donors.

(1) Private sector

Indonesian Cocoa Traders Association (ASKINDO) South Sulawesi branch

National association intended for the entire cocoa industry, but the leadership and most members are by traders. In South Sulawesi, there are 51 active members. Its activities include i) lobby to protect the benefits of cocoa industry, ii) advocating opinions of industry through seminars, iii) support for cocoa farmers. Support for cocoa farmer is recently expanded in response to the spread of

pest infections and aging of plantation, including;

Cocoa Village Model (CVM), cocoa based community development at Mamuju district since 2003, where farmers' groups are trained by three field facilitators for good farming practices and their organizational capacity is strengthened. Formation of cooperatives (or farmers' group) is a key in CVM to enable smooth and efficient skill transfer. Social development issues are also addressed via farmers' organizations.

Demonstration Plots (Demplot) at each cocoa producing district in South Sulawesi since 2005, where twelve staffs are assigned as field facilitators. In Demplot, plant materials like fertilizers, seedlings, bud-woods for regeneration of aging plantation are provided together with training of good farming practices for cocoa farmers.

ASKINDO was also involved in SUCCESS Project (2000-2005), where their present field facilitators were trained during its implementation.

PT. Effem, Indonesia

A local cocoa processing subsidiary of Masterfoods Inc., located in Makassar has extended its technical assistance and research arms to cocoa sector in Sulawesi. It started support activity with proactive involvement into SUCCESS Project through provision of trainers for farmer training and field facilitators, then followed by;

Pest Reduction Integrated Management (PRIMA) Project (2003-04) for some 1,000 farmers in 1,000 ha at Luwu District by its own fund. PRIMA was implemented to develop quality-oriented supply chain and integrated management practice for CPB control, and to promote good farming practices via facilitation service.

After the completion, Effem expanded the coverage of area and the number of field facilitator (now twelve staffs), being hired by Effem. Facilitators at several districts continuously assist farmers to adopt good farming practices, and plant regeneration skills to assure consistent supply of good beans.

Effem also launched **Cocoa Sustainability Team** internally, where the said field facilitator works for local plantation sites and research activity to improve seed variety is being undertaken.

NGOs, Business
Development Service
(BDS) providers

Several NGOs and BDS providers are active in supporting cocoa farmers. A few of them function as intermediary-facilitator on behalf of farmers and exporters to strengthen their linkage, where they charge fee (usually a few percent of cocoa dealing price) in return for technical guidance on good farming practices, securing sufficient yield, and quality improvement of beans. Most active ones in cocoa sector are SCORE Institute and SICOS.

Business opportunity as financial intermediary consultant is available to many BDS providers and NGOs. Bank Indonesia has promoted the financial intermediary scheme to improve farmers' access to banking. Intermediary consultants on behalf of intending farmers will take the necessary borrowing procedures, and monitor the use and repayment by farmers on behalf of lenders.

(2) Academic and R&D institutions

University of Hasanuddin
(UNHAS)

Many lectures and students were involved as technical consultant, facilitator, assistant in the projects and studies rendered by donors, private sector and local government, and have presented technical papers on cocoa plantation, pest and disease infestations, agro-ecology, socio-economic aspect of cocoa farmers. Since expertise is

not put together into one specific center in the university, one should rely on personal connection for access to expert assistance.

Indonesian Coffee and
Cocoa Research Institute
(ICCRI)

Only one national agricultural research station specialized in cocoa in Indonesia, funded by Dept. of Agriculture (DOA). ICCRI has bred several hybrid varieties with high unit yield and quality, and tolerance to pests and diseases. The six hybrids are released so far. Some hybrids selected for VSD and CPB tolerance currently undergo tests. ICCRI also issues a limited quantity of seeds and grafting materials from cloned seed gardens to farmers through DISBUN on request. It also provides training to extension staffs and farmers, as well as information and advisory services both to state and private sectors.

Due to its location in East Java, ICCRI so far provides limited research activity and has less links to extension service in Sulawesi. Local stakeholders expect ICCRI to more intensively involve in Sulawesi cocoa sector on seed variety improvement, selection and supply of good seedlings / bud-wood, assistance on rehabilitation and CPB control.

Agricultural Technology
Assessment Center
(BTPT),
South Sulawesi branch

DOA funded technology assessment and dissemination body in South Sulawesi, covering all types of crop. BTPT is now staffed with 300 technicians, extension staffs and researchers. Concerning cocoa, BTPT recently commences experimental farm in North Luwu, which conducts seed variety improvement, demonstration of farming practices, clinic for farmers, collection of mother tree, but still rely on technical supports from ICCRI. Although BTPT was also involved in research component of PRIMA, capacity for research is still weak.

Australian Center for
International Agricultural
Research (ACIAR)

ACIAR conducted research on improved varieties for pest and disease resistance, and testing these varieties during SUCCESS Project led by USAID. Since then, ICCRI and BTPT have maintained occasional contacts.

(3) Financial institutions (proactive ones)

Bank Indonesia (BI)
Makassar branch

BI has facilitated the financial access improvement of SMEs and farmers' groups through technical assistance for **financial intermediary consultant (KKMB)** since 2004 in South Sulawesi. BI has trained 53 consultants (only 30% are still active) as facilitator, and facilitators has assisted to close Rp. 17 billions of loan agreement.

BI also collaborates with **Gerbang Emas Program** in South Sulawesi, where eleven commodities including cocoa are selected for their promotion by leveraging KKMB resource. Loan outstanding for the program accounts for Rp. 757.5 million with around 5,500 accounts. Of the total, Rp. 406.0 million has been allocated for cocoa sector. But only 0.3% of the loan has been utilized for plantation, the rest goes to trader, not contributing to restoration of cocoa plantation base.

Bank Rakyat Indonesia
(BRI)

Partly subsidized by the central government, BRI starts **Estate Rehabilitation Credit Scheme (KPEN-RP)**, cocoa is one of the estate crops for financial assistance. The scheme intends to facilitate rehabilitation (and development) of plantation through provision of concessionary loan directly to farmers (in case of cocoa).

Under the non-partnership model for individual farmers, applicant farmers should be a member of a farmers' organization, hold personal registration, and follow guidance from DISBUN. A certification from the Bupati / Mayor is also required. The maximum land area for credit is 4 ha per farmer, and the land certificate is accepted by bank as collateral. Loan repayment period is 13 years with a grace period of 5 years, during which an interest rate of 10% is applied.

In the partnership model, which cooperatives with maximum land areas of 2,000 ha are qualified for, the procedures and requirements are more like usual commercial loan, but the conditions regarding grace period and interest rate will be the same as non-partnership model.

DISBUN has to give guidance to the borrowing farmers in both cases.

Bank Niaga
Bank Mandiri

Both banks introduce **Warehousing Receipt Program** as a way to help working capital finance of local cocoa exporters or traders. This scheme requires exporters or traders to have selling contracts with buyers as collateral. If banks evaluate the contract as securable, 70% of contracted amount shall be lent. Banks appoint the third party collateral manager (e.g. PT. Sucofindo) to check the quality and quantity of cocoa stock.

Bank Muamalat (BMTs)

Formal and private banks can hardly find the way to direct lending to farmers' group or farmers due to their lack of legal status and cost of transaction. Some BMTs can fill this neglected segment, using land certificate as collateral. BMT is local-based non-bank, which provides small loan through profit-sharing, and there are more or less 80 BMTs in South Sulawesi.

Interview with Bank Indonesia, Makassar branch reveals that many farmers did not possess land title as they either work on rented lands or as labors for absent land owners. Lack of collateral makes credit inaccessible to the actual farmers at plantation.

To make land registered is a costly action for many farmers. It costs over Rp. 600,000 per farmland certificate for the basic charge, thus inhibiting them from accessing to registration. Currently the Provincial Government of South Sulawesi implements the program called as Sertifikasi Massal Swadaya (SMS) to facilitate land owning farmers to be registered, where the charges required for registration are financed or subsidized. However, SMS program takes place in a limited scale.

(4) Local government

Local Department of Estate Crops (DISBUN)

Cocoa plantation falls under the direction of DISBUN along with coconut, rubber, oil-palm, etc. DISBUN, located where cocoa farming holds the larger economic presence, usually allocates budget for re-plantation, rehabilitation and development of cocoa plantation (to lesser extent). DISBUN sometimes provides revolving fund to selected farmers' groups, and planting materials with free, but to the very limited farmers.

In Pinrang District for case study, DISBUN under the budget allocation from DOA, has been conducting the following cocoa related programs;

- **National Cocoa IPM and "condomization" program**, granting the plastic cover for cocoa pods
- **Cocoa Revitalization Program**, pilot project for re-plantation

of cocoa plant through granting seedlings and fertilizers

Although, DISBUN has some tools of farmers' support, technical guidance to be followed is weak. Routine extension activity is to be rendered in practice by BIPP (see the next).

Each DISBUN has also extension arms. The degree of dedication and capability of public extension service is judged as weak due to structural and human resource factors. Further, little or no new recruitment is being made, thereby reducing the extension intensity.

Under SUCCESS Project, some DISBUN staffs were trained to extend good farming practice training. But most DISBUN staffs are not expert in cocoa, and due to budget constraint, the field service that DISBUN staffs render to cocoa farmers is quite minimum.

Research-Extension linkages are another weak point, which results in minimal interaction of extension staffs with researchers to seek solutions for field problems.

Agricultural Information and Training Agency (BIPP)

As mentioned, routine extension service is to be rendered in practice by this agency. In Pinrang District for case study, the agency has 140 extension service staff, but only 11 of them are in service for estate crop sector including cocoa plantation and stationed at each important sub-district. BIPP in general allocate its large portion of extension resources to food crop sector but estate sector to a lesser extent.

Knowledge and training opportunity on cocoa plantation is limited. Training held outside is usually seated by DISBUN. The area of coverage (cocoa plantation) per extension staff has been expanded.

Local Department of Industry, Cooperatives and SMEs (DISPERINDAG)

Cocoa trading and processing, and cooperative issues fall under the direction of DISPERINDAG. DIPERINDAG now conducts **Industrial Cluster Development Program** for some 10 commodities in South Sulawesi including cocoa. Cocoa farmers' organizations are assisted under this program through the provision of fermentation and drying equipment, but such assistances is limited to only a few numbers of organizations.

(5) Multi- and bi-lateral donors

United States Agency for International Development (USAID)

USAID has the highest presence among the donors, and undertook most extensive technical assistance to cocoa sector in Sulawesi, through the following project;

The SUCCESS (Sustainable Cocoa Extension Services for Smallholders) Project (2000-05), directly reaching 30,000 cocoa farmers in three provinces of Sulawesi through Farmer Field Schools (FFS) approach, and transferring integrated pest management and good farming practices for farmers, in response to the spread of CPB infection and anticipated loss of production. Pest management and farming practices adopted in this project is known as PsPSP, comprising of i) frequent harvesting, ii) pruning, iii) sanitation, iv) fertilization. Project also helped strengthening the partnership among stakeholders to support sustainable development of the cocoa sector.

Project evaluation report concludes that dissemination of PsPSP practice in the project has helped participating cocoa farmers to improve their income by enabling reduction of loss caused by CPB, and enlarging and increasing cocoa pod grown from the healthier plants.

USAID will commence new initiative called as **Agribusiness Market and Support Activity (AMARTA) Project**. AMARTA (US\$ 15 millions over three years) is designed to improve

agribusiness systems through Public-Private-Partnership (PPP) approach for eight commodities, comprising of i) high value export-commodities and ii) high value horticulture products for domestic market. Cocoa in Sulawesi has been selected as one of targets. Components of AMARTA include value chain strategy formulation, implementation of support activities through matching-grant to proposal from stakeholders, provision of training & consultancy. Through AMARTA, cocoa sector in Sulawesi is expected to demonstrate case to show how PPP approach works within agribusiness sector in Indonesia.

International Finance Corporation (IFC)

IFC conducts **Program for Eastern Indonesia SME Assistance (IFC-PENSA)**, where one component titled as “Agribusiness Linkage” covers cocoa sector in Sulawesi over two years since 2005. Primary objective is to support formation of cocoa partnership model through PPP, and to play a facilitator role to assist in attracting investments by commercial sector and financial institution for creation of sustainable cocoa industry. IFC-PENSA has been so far leading an initiative to establish the partnership framework, called as **Cocoa Sustainability Partnership (CSP)**, and currently facilitates for improvement of farmers’ access to finance in collaboration with banks and provide trainings for farmer group empowerment.

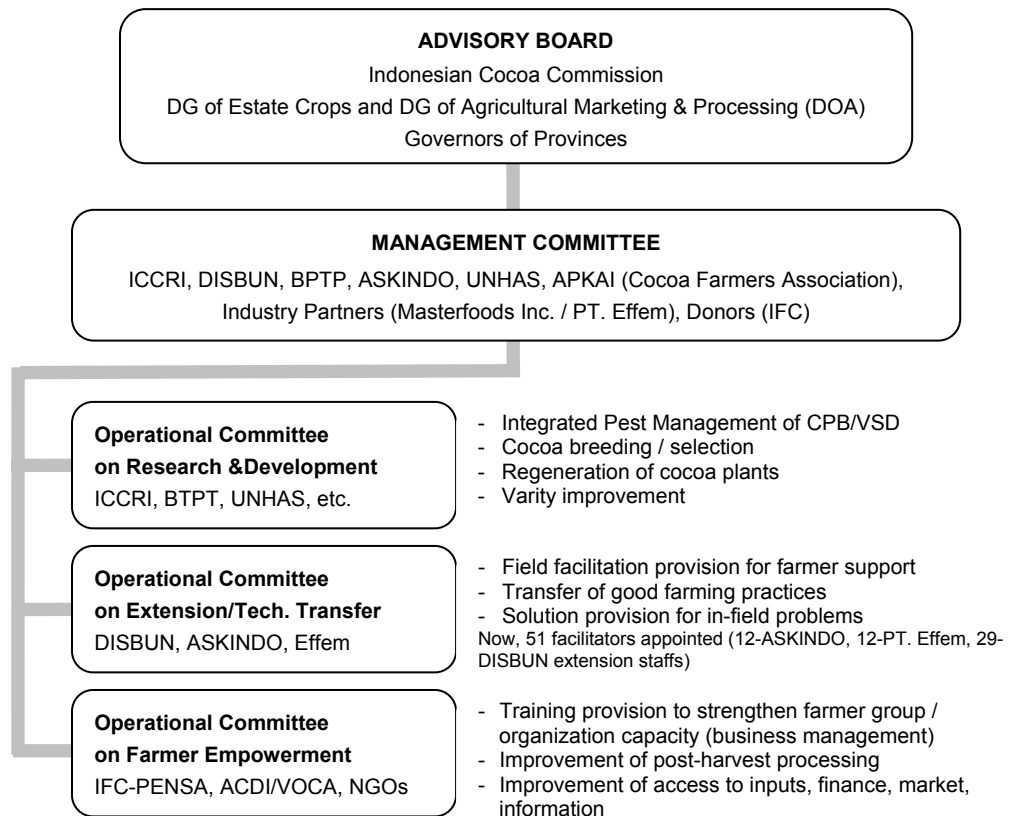
The World Bank

The World Bank has approved is an agricultural support project titled as **Farmer Empowerment through Agricultural Technology and Information (FEATI) for Eastern Indonesia** (US\$ 123 million over six years), covering 18 provinces and 71 districts (including South Sulawesi, cocoa producing district of Luwu and Bone). FEATI include the provision of “Farmer-managed Activity” (FMA) grants to farmers’ initiatives to innovate their practices and products. Cocoa related activities in Sulawesi will be likely proposed to the grant, since cocoa producing districts in South and Southeast Sulawesi are covered. FEATI will facilitate PPP approach at the village and district levels, where farmers are expected to design their grant proposal in partnership with private sector and extension service.

3.5.2 Supporting framework

Since the spread of CPB infections, many stakeholders have started their own initiatives for cocoa sector but in less coordinated or harmonized manner. Most apparently, coordination or harmonization between government service (e.g., provision of plantation materials) and initiative by private sector (field facilitation) is weak, being unable to maximize the effects of these supporting activities.

IFC-PENSA through its Agribusiness Linkage has led the formation process of cocoa stakeholder partnership model, and helped establishment of supporting framework called as **Cocoa Sustainability Partnership (CSP)**. Role of CSP is to coordinate cocoa sector development activities, and assist in transferring good farming practices and empowering farmers, towards the long-term sustainability and profitability of cocoa industry. CSP also coordinates the portfolio of donor and other funded activities so that a consistency between these activities and overall sector needs would be maintained.



CSP originated in Sulawesi, now only involves stakeholders in Sulawesi, but is expected to expand nationally as supporter and resource available in this framework grows.

Figure 21 Structure of Cocoa Sustainability Partnership (CSP)

3.6 Policy and Regulations Concerned

3.6.1 Indonesian Cocoa Commission and policy directions

No apparent policy at the national level existed for cocoa sector for long years, exercising virtually no government interventions except for taxes. But as competitive advantage held by Indonesian cocoa gradually is undermined (i.e. decline in yield followed by decreasing supply of good beans), GOI is expected to have some degrees of responsibility to ensure the sustainability of cocoa sector. Based on the Act. No.18/2004 on estate plantation as legal basis, DOA issued Ministerial Degree to establish Indonesia Cocoa Commission (ICC) under its chair in January 2006.

ICC invites industry association as the board member including ASKINDO, Cocoa and Chocolate Association (APIKCI), Indonesian Cocoa Industry Association (AIKI) and Cocoa Farmer Association (APKAI). Other departments, banks, Land Certificate Agency, Sulawesi Regional Development Coordination Board, National Standard Board, ICCRI also joined ICC as member. ICC will work to provide advice to DOA in formulating policy and regulations on cocoa sector, and to analyze a possibility of Indonesian Cocoa Board (as seen in Malaysia).

Major concerns of ICC are to ensure the sustainability of cocoa supply through improving yield and quality, and to vitalize local processing industry, most of which are either non-

operation or operating at below capacity. Policy directions and strategies recommended by ICC are as follows. CSP works also closely with ICC to ensure that its activities are in line with and supported by policy direction recommended by ICC.

Policy direction recommended by ICC

- Promotion of good farming and manufacturing practices
- Promotion of integrated cocoa quality management system
- Promotion of selective fermented cocoa (up to 30% of total cocoa production)
- Development of domestic processing industry
- Promotion of market networking and access (both domestic and international)

Main Strategies (2006-09)

- Strategy 1: Improvement of cocoa plantation yield
 - Strategy 2: Development of post-harvest technology and quality to support domestic processing industry and exports
 - Strategy 3: Approval program for quality improvement
 - Strategy 4: Development of domestic and export markets
-

3.6.2 Regulations

Aside from establishment of national advisory committee, the following regulations exist, and their revisions are discussed among GOI and cocoa-related associations.

(1) Suspension of 10% Value-added Tax for primary agro-products

This VAT was imposed to any primary agro-processors for their use of agro-materials including cocoa beans, where 10% of material buying price was charged to the processors. Although the VAT was refundable, processors claimed that it would take outrageous time to process application for refund, squeezing their cash flow. Industries also explained that an existence of VAT virtually would discourage cocoa traders from selling to processors, since traders had to take procedure of rendering VAT to tax office. In response to agro-industry's request, GOI already determined to suspend this VAT, and suspension of VAT was already approved by Department of Finance (DOF).

(2) Export tax on cocoa beans

GOI is now discussing export taxation on cocoa beans (5% of export value). GOI's intention is to support domestic processing industries. However, ASKINDO is at the position to strongly oppose this export tax on the ground that the tax would be an additional burden to cocoa farmers, and taxation would discourage them to plant cocoa.

(3) Government (the South Sulawesi) charge to exported cocoa

Provincial Government of South Sulawesi prescribes that exporters pay the levy of Rp. 40 per kg for any exported beans from South Sulawesi. Total levy is roughly estimated to amount to Rp. 7.7 billions in 2005. The half of levy collected from traders is placed into the general budget of the province, the remaining goes to the revenue of ASKINDO. It utilizes the revenue to finance the program like CVM, training and seminar.

(4) Trade terms on cocoa products in the world market

In general, potential export destinations of cocoa products such as Malaysia, China, India (and EUs, Japan) usually impose high blocking tariffs on cocoa products. In view of “harmonization” of import tariff on cocoas, GOI has agreed to increase import duty on cocoa beans and products from 5% to 15%. Malaysia, an immediate competitor of Indonesia, opens the market for beans without tariff barrier to secure sufficient supply of beans for its processing industry. On the other hand, the present import duty on cocoa beans in Indonesia may inhibit the local processors from blending more quality beans (in terms of flavor and fat yield), and adversely affect the operation of local processors.

(5) ASEAN-China Free Trade Agreement

China recently removed the import tariff on cocoa powder (sugar-containing) from Indonesia (from 15%), but not yet on cocoa butter or non sugar-containing powder. For Chinese cocoa market, Indonesia has to bear import duty ranging from 8 to 22% for its cocoa beans and products until at least 2007 (Memorandum of Understanding already signed by Department of Trade), while Malaysia can already benefit from a zero-tariff for the five cocoa products originating from Malaysia to China under EHP. Trade facilitation initiatives such as ASEAN and bilateral FTA in favor of Indonesian side are expected to bring positive impacts in cocoa product exports from Indonesia.

3.6.3 National Standard Indonesia on cocoa

There is an Indonesian national quality standard for exports of cocoa beans (SNI 01-2323-1994/Revision 2002), developed by the National Standard Board. If exporters or buyers require certification of their beans, the inspection would be performed by one of two superintending companies. Inspector tests sample beans against the quality standards for seven general requirements (moisture content, broken, waste, foreign matter levels, etc.) and five specific requirements (bean count, moldiness, unfermented, insect-damaged and germinated ratios) under three grades of bulk beans.

The international trading term used to describe standard quality of unfermented bulk bean is FAQ, and in terms of SNI standards, bulk bean of Grade I and II specifications are considered as FAQ. Sulawesi beans falls under the lowest Grade III, even below FAQ. However, there is no enforceable measure in place to ensure that the beans exported from Indonesia conform to the requirements stipulated by high grade. Lack of enforceability and prevailing low quality of beans virtually make Indonesian quality standard not workable or useless.

CHAPTER 4 CHALLENGES AND ACTIONS FOR COCOA SECTOR

4.1 Issues and Constraints

Issues and constraints that arise from the supply chain analysis for cocoa sector in South Sulawesi are highlighted by each aspect as below;

(1) Production and post-harvest aspect

Issue / constraint	Explanation
Decline of cocoa farm productivity, leading to the loss of income potential for cocoa farmers	<ul style="list-style-type: none"> - Present average yield of cocoa recorded in the field is as low as 0.3 tons / ha, compared to a potential yield of over 1.0 tons / ha. - Average age of cocoa trees is estimated to be over 18 years, surpassing the peak productive period of 8 to 12 years. Poor farming practices have caused yield decline at pre-mature stage. - Farmers are susceptible to the higher incidence of pest and disease, particularly CPB, which accounts for the largest loss of production. Losses by other diseases also appear to rise. - Many farmers still lack awareness for good farming practices due to lack of knowledge and over aging of their trees. - Though many farmers use fertilizer, but rarely use in adequate manner and volume due to lack of knowledge and fund.
Limited availability and access to planting materials	<ul style="list-style-type: none"> - Seeds to raise seedlings and bud-wood for grafting are mostly selected by farmers without technical guidance by others, and will not be suitable ones in-terms of resistance to pest and disease, yield, and bean composition, etc. - Quantity of seeds supplied from ICCRI (to DISBUN) to develop seedlings for distribution is limited. Availability of inputs like fertilizer is also limited, causing application of unbalanced use by farmers, or urea only in many cases.
Sluggish and inadequate re-plantation and rehabilitation activity	<ul style="list-style-type: none"> - During the cocoa booming and peak production of many trees in the mid to late 1990's, little attention was paid to re-plantation. And decline of cocoa prices after peak caused lack of funds, and has prevented farmers from re-plantation. - Cocoa producers are mostly smallholder, possessing around one ha of plantation per farmer. In many cases, each smallholder can not afford to spend sufficient resources for proper planting materials and sustainable management of plantations. - Though re-plantation programs are gradually initiated by public support, the coverage is still insufficient to bring a significant impact. Lack of guidance for re-plantation methods is also observed in case of public supported re-plantation program.
Lower quality of beans (lower fat content and higher waste content)	<ul style="list-style-type: none"> - Compared to before, bean quality becomes poor in terms of physical (lighter bean weight, higher waste content) and chemical (lower fat content), due to aging of trees, poor plant maintenance, and lack of incentive to improve.
Limited practice of proper bean preparation and fermentation at the farmer's level	<ul style="list-style-type: none"> - Farmers usually sell beans soon after harvest (in wet or semi-dried condition) to obtain immediate cash. This has resulted in high degree of variability in the beans (poor bean preparation), which makes buyers discount the price more. Many farmers are of the view that price differential is insufficient to compensate post-harvest operation. - Fermentation is rarely done, since the majority of buyers (exporters) do not demand this for Sulawesi beans.

(2) Trading and processing aspects

Issue / constraint	Explanation
Difficulty in securing consistent supply of good beans	<ul style="list-style-type: none"> - Related to the lower yield and quality degradation, exporters and processors increasingly face difficulty in securing consistent supply of good beans. Local exporters are being marginalized through fierce competition with multinational traders which have sufficient working capital. - Local processors are more aware of this difficulty, since multinational exporters of beans increase the share of purchase.
High degree of variability in bean quality offered by farmers via intermediaries (volume-based transaction of beans)	<ul style="list-style-type: none"> - Related to lack of bean standard at farmers and collectors level, and lack of motivation by them to do appropriate drying and grading of beans, exporters and processors have to spend considerable resources in drying and grading of beans. This leads to additional discount to the price offered to suppliers.
Lower processing efficiency due to the lower fat yield and lack of fermented beans	<ul style="list-style-type: none"> - Related to the lower fat yield (from 38% down to 34% during the last few years) and un-fermentation, local processors face an inefficient processing operation (more beans to grind, long factory-down time caused by unfermented beans). - Local processors have a demand for fermentation, and are prepared to pay a price differential ranging between Rp. 500 - 1,500 per kg. A few local processors have started direct sourcing of quality beans, offering a price differential.
Limited market avenues for cocoa powder/cake	<ul style="list-style-type: none"> - Related to bean quality of Sulawesi, cocoa powder/cake as by-product after processing butter has poor flavor, which only has a limited market in size and low-end market. This leads to tough marketing of these products unless the low-end market is further expanded, affecting commercial viability of the plant operation.
Weak export promotion service to the industry	<ul style="list-style-type: none"> - Local processors in Makassar reveal the support needs for the provision of specific market information, inquiry and matching service with potential buyers, and trade mission in the growing markets. Public service for such needs is expected from DISPERINDAG, but processors consider that their present capacity can not meet such specific and detailed requests.

(3) Institutional aspect

Issue / constraint	Explanation
Supporting (extension and facilitation) service	
Weak dedication and capability of public extension service	<ul style="list-style-type: none"> - Although DISBUN has some tools of farmers' support, technical guidance to be followed is weak. Routine extension activity is to be rendered in practice by BIPP. - Dedication and capability of public extension service for cocoa is considered weak, due to structural and human factors. Knowledge and training opportunity on cocoa plantation is limited.
Limited service coverage	<ul style="list-style-type: none"> - Although the number of quality facilitators is being increased with the cooperation of private sector, their service coverage in South Sulawesi is still limited. - Even BIPP and DISBUN now allocate only one extension staff for cocoa plantation per sub-district. BIPP in general allocates its large portion of extension resources to food crop sector but estate sector to a lesser extent.

Research and Development (R&D) service	
Limited outreach of R&D functions	<ul style="list-style-type: none"> - Specialized R&D function for cocoa is now limited to ICCRI located in East Java. As a result, there is limited availability of improved planting materials, research activity for cocoa plantation particularly targeted for Sulawesi. - Although provincial level agricultural research center (BTPT) exists in Makassar, its outreach to the field is still weak. R&D capacity of BTPT is also questionable. - Many basic areas covering crop establishment, production and post harvest practice, where considerable improvements are expected, remain unexplored through systematic research.
Weak linkage between research and extension	<ul style="list-style-type: none"> - Flow of research findings by ICCRI does not usually reach the cocoa farm level, thus not receiving feed-backs from the field, since research-extension linkage is weak. For example, selection of planting material is mostly left to farmers.
Other government service	
Lack of reliable statistical information on cocoa production	<ul style="list-style-type: none"> - Reliable statistical data does not exist for cocoa production, plantation area. Figures of public institutions are considered to be overestimated than what private sector assumes. This may lead to misunderstanding the real situation and obstacle in preparing policy and supporting measures.
Weak management of land use data for cocoa plantation	<ul style="list-style-type: none"> - Since the land clearance for plantation has been private-driven by smallholders, the data on land use, plantation ages, and area suitable for cocoa plantation has not been well managed. This leads to inefficiency in extension service and lack of proper guidance to the farmers.
Farmers' organization	
Limited collective action by farmers	<ul style="list-style-type: none"> - Although there are some issues for which collective action of farmers would bring more economic and effective solutions, farmers' view on collective actions is largely negative. Successful farmers' organizations usually start with collective marketing to sell beans directly to buyers which may bring a return to them, and extends their action to other areas.
Lack of dedicated support for empowerment of farmers' organization (public service)	<ul style="list-style-type: none"> - Though continuous contact with facilitation service is a key to strengthen the function of farmers' organization, the current volume of outreach is limited. Interaction between public extension and farmers' group is usually limited at the time of program implementation, and the farmers are rarely followed-up later on through technical guidance and consultation.
Lack of access to finance due to no legal status	<ul style="list-style-type: none"> - Since farmers' group does not have legal status, it is not qualified to borrow from banking institutions. This may partly inhibit farmers from taking new initiatives through collective actions.

(4) Financing aspect

Issue / constraint	Explanation
Lack of access to financial institutions	<ul style="list-style-type: none"> - Opportunity to regenerate the plantation and realize good farming practice is constrained due to lack of fund. Although structural factors at financial institutions exist for poor access of farmers, the biggest concern is high cost to register the land which inhibits many farmers from accessing to certificate as collateral. - Farmers' groups do not have legal status and can not access to formal private banking, although they can receive the fund from

	government.
Effectiveness of institutional credit scheme	- Although the provincial government introduces credit scheme for cocoa sector under Gerbang Emas, the majority of credit goes to cocoa traders, not contributing to restoration of plantation base. Cocoa plantation is relatively long-term activity, if the scheme is properly designed for such long-term plantation is questioned.
Poor public announcement of institutional credit scheme and lack of capability to prepare loan application	- This is more apparent, unless the government utilizes the facilitator function to widely announce the scheme and adequately address the farmers' capability to apply for the scheme in a prescribed manner.

(5) Regulatory aspect

Issue / constraint	Explanation
Effectiveness of export tax	- An export tax which intends to vitalize local processing industry could decrease the farm-gate price of beans and bring about negatives for farmers' decision resulting in decline in production. - However, association of local processors argues that an export tax is critical to the viability of their industry.
Effectiveness of Indonesian import duty on cocoa beans	- Import duty on cocoa bean may put local processor in relatively disadvantageous position to processor particularly in Malaysia, where import beans from any origin is free from duty. Blending quality beans from different origin is a usual measure to cater for buyers' requirements for powder/cake product. Duty distorts processor's decision in sourcing import beans to some extent.
Disadvantageous trade terms with growing markets to Malaysia	- Related to ASEAN-China FTA and EHP, Indonesia has to bear import duty ranging from 8 to 22% for its cocoa beans and products (except for powder) until at least 2007, while Malaysia now can benefit from a zero-tariff for the five cocoa products originating from Malaysia to China under EHP.
Weak enforceability of national standard on cocoa	- National standard on cocoa does not work well. There is no regulatory mechanism enforcing that Indonesian beans exported conform to the stipulated requirements. This encourages bean export in low quality condition, resulting in price discount applied by buyers.

(6) Infrastructure aspect

Issue / constraint	Explanation
Shortage in power and interruption of power supply	- Related to chronic shortage in power, interruption of power supply sometimes makes processors halt their factory operation and cause damage to their machinery and equipment. Though processors usually are equipped with generator, use of this leads to additional cost of operation.
Poorly maintained roads at the remote villages	- Road network in South Sulawesi is well developed, together with port facility in Makassar. But in the remote villages, there are many sections unpaved, and bridges are weak in loading capacity.

4.2 Likely Scenario and Challenges

Unless issues and constraints above are urgently addressed with an adequate scale of assistance by stakeholders, cocoa sector in the South Sulawesi (and Sulawesi as a whole) will not cut prevailing vicious cycle of decline in productivity and decreasing supply of quality beans. This will (and already to some extent) bring about the further negative impacts onto the whole cocoa sector in South Sulawesi in the following manners. The performance of cocoa sector will be anticipated to be much worse.

- **Farmers will increasingly gain less revenue** from cocoa farming, unless proper farm management, re-plantation or rehabilitation, and desirable post-harvest operation are practiced. **Increasing number of farmers may abandon their plantations** which are aged or infected, and change crops to be grown, in the end.
- Intermediaries, who benefit from volume-based transactions but lack working capitals, will face the fiercer competitions and will be marginalized, since collecting capacity and quality-attentive attitude become inevitable.
- Tied to decreasing supply of good beans, the competition among exporters and local processors to secure consistent supply of good beans will become fiercer. **Multinational affiliates** with strong financial back-up **will come to handle more share of bean trade, marginalizing the share of local traders and processors.**
- Local processors both in particular will face increasingly inconsistent supply of beans with the lower fat yield of beans. As a result, **more number of local processors will be either non-operational.** Increasing share of bean trade by the multinational traders has been partly triggered by the expansion of Malaysian and other Asian processing industries.
- **Importers will intensify alternative sourcing of cocoa production such as Vietnam, Papua New Guinea, Philippines, and other regions of Indonesia.** Some multinational cocoa traders and processors have already extended the buying station and traders' network, and technical assistance to the smallholder farmers for good farming practice, fermentation, and so on particularly in Vietnam.

In response to the above scenario, cocoa farmers need to take steps to restore the production bases of cocoa plantation in the first place. Following or in parallel to such efforts, stakeholders are expected to extend outreach and develop supporting activities to strengthen farmers' capability to manage plantation and quality improvement. Processors and exporters are also expected to go in direct-buying from farmers or clusters of farmers' groups, in attempts to cut issues of quality and production loss at the earlier stage of supply chain to secure consistent supply of good beans.

Challenges ahead of cocoa sector in South Sulawesi, which are to be faced by farmers and stakeholders, are summarized as follows;

- **Restoration and expansion of cocoa production base**, for Sulawesi beans to maintain the foundation for its competitive advantage (ability to supply bulk beans in large quantity at the low cost)

- **Improvement of cocoa farm management**, for cocoa farmers to continuously realize the sufficient level of cocoa production with acceptable level of bean quality through socialization of good farming practices. Commercial distribution system for improved planting materials for farmers will be also challenged
- **Farmer's participation in value addition activity**, for cocoa farmers to actively engage in value addition activities, particularly at post-harvest stage, which are also beneficial to the industries
- **Market penetration**, for industries to penetrate into international (emerging markets in particular) and domestic markets, through strengthening of supporting services and regulatory improvements
- **Promotion of local processing industry**, for local processing industries to grow through strengthening of supporting services and creation of the enabling business environments

To address these challenges needs continuous private sector's initiative to be worked under the existing supporting framework of Cocoa Sustainability Partnership, but also require the following initiatives;

- **Empowerment of farmers' organization and their access to finance** needs to be tackled, as a means to facilitate the effective implementation of some action plans required for the above challenges, and similarly,
- **Improvement of public services** would be considered as an essential factor for the majority of cocoa farmers, and industries. Public service to be improved may include extension service, R&D functions, and other related services.

4.3 Required Action Plans

To address properly challenges to be faced by Sulawesi cocoa sector, the relevant stakeholders should discuss and implement the following action plans.

(1) Restoration and expansion of cocoa production base

Title	Brief Description	Beneficiary Executor, Supporter
Acceleration of re-plantation and rehabilitation program	<ul style="list-style-type: none"> - An immediate initiative on regeneration of cocoa plantation should be taken by re-plantation and rehabilitation in South Sulawesi. Government should expand the present scale of Cocoa Rehabilitation Program in cocoa producing districts. - Government also has to improve the approach to the program implementation from mere provision of planting inputs to holistic one, starting from field study to prepare regeneration plan (selection of method), training and seminar on re-plantation and rehabilitation technique, crop diversification, good farming practices, pest / disease control, etc. - Farmers' organizations are recipient. The action will seek for cooperation 	Direct beneficiary: - Cocoa farmers Executor: - Prov. & Kab. DISBUN Supporter: - BIPP - Private & third sectors (e.g. ASKINDO, UNHAS) - ICCRI

	with R&D institutions on selection and supply of planting materials, and include training of public extension staff on re-plantation and rehabilitation.	
Enhanced facilitation service to assist farmers' access to BRI scheme	<ul style="list-style-type: none"> - BRI has prepared Estate Rehabilitation Credit Scheme (KPEN-RP) to assist farmers or its organization to access to fund for re-plantation and rehabilitation of cocoa plantation. - Government has to widely announce the scheme and facilitate farmers to access to the scheme. Government also needs to provide dedicated technical guidance and training to farmers who use this scheme on scheduling plant regeneration and selecting planting materials. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers <p>Executor:</p> <ul style="list-style-type: none"> - BRI, - Prov. & Kab. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - Private & third sectors (e.g. BDS, UNHAS)

(2) Improvement of cocoa farm management

Title	Brief Description	Direct beneficiary Executor, Supporter
Improvement of the existing cocoa farm productivity through socialization of good farming practices	<ul style="list-style-type: none"> - While the benefits of re-plantation and rehabilitation will be realized on the mid to long term, the sufficient level of cocoa production with acceptable level of quality at the existing cocoa farm has to be recovered and maintained through socialization of good farming practices. - The action includes training and seminar on good farming practices (already developed one such as PsPSP and IPM), formulation of farm management plan and schedule, and supply of required planting inputs like fertilizers. Field facilitators are to be assigned for technical guidance. - The action should call for the mobilization of facilitators retained by private sector like ASKINDO. This will bring strong motivations to farmers to improve their farming practices. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers <p>Executors:</p> <ul style="list-style-type: none"> - Prov. & Kab. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - BIPP, - Private & third sectors (e.g. ASKINDO, UNHAS)
Improvement of planting material supply system (village-based nursery)	<ul style="list-style-type: none"> - Planting materials are expected to come from recommended clones having superior characteristics. But planting materials are usually selected by farmers' own observation, and supply of recommended ones by ICCRI and public nursery is quite limited. Therefore, the action to improve supply system of planting materials through village-level commercial nurseries will be of worth. - The action start with identification of intending farmers or their organizations, business planning of village-level nursery, training on tree selection, raising of seedlings, facility layout, marketing, followed by trial operation. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers <p>Executors:</p> <ul style="list-style-type: none"> - Prov. & Kab. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - ICCRI - BTPT - BIPP - UNHAS

	<ul style="list-style-type: none"> - The action requires the outreach by ICCRI and support of DISBUN for technical guidance, training provision. ICCRI is also expected to prepare the guideline for mother plant selection, and DISBUN to prepare nursery certificate system to assure the quality of seedlings. - Village level nursery run by farmers' organization is also expected to also deal with fertilizer and chemical distribution. 	
Development of pest and disease-resistant variety	<ul style="list-style-type: none"> - Farmers increasingly face the higher incidence of pest / disease, particularly CPB. Infection of other pests and diseases also appear to be on rise. - The action to develop pest and disease resistant variety, and conduct R&D. Trial plantation should be started and taken by government with the support of ICCRI. 	<p>Beneficiary:</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - ICCRI & Prov. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - Overseas R&D

(3) Farmer's participation in value addition activity

Title	Brief Description	Direct beneficiary Executor, Supporter
Matching support for supply of fermented beans between farmers and local processors (also for market penetration and promotion of local processing industry)	<ul style="list-style-type: none"> - Some local processors are potential buyer of fermented beans, willing to offer price differential. But the farmers are not well aware of this. Therefore, an action to match the potential demand of processors and supply of farmer has a rationale. - The action includes an identification of processors and farmers' organizations willing to participate, training on good farming practice and fermentation, trial operation, drafting buying agreement. - This action will follow an initiative of PT. Bumi Tangerang, and require the partnership with local processors. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers - Local processors <p>Executor:</p> <ul style="list-style-type: none"> - Prov. DISPERINDAG - Prov. & Kab. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - Cocoa industry assoc. - Private & third sectors (e.g. UNHAS) - Coop. Bina Harappan
Support for establishment and operation of community-based marketing stations	<ul style="list-style-type: none"> - Presently, bean preparation is completed by exporters, since intermediaries and farmers are not aware of its importance, or the chance of value addition. Community-based marketing station can be an opportunity for farmers to start proper bean preparation and be more quality-sensitive. - The action includes an identification of farmers' organizations (and collectors) willing to start, training on proper bean preparation, and business management and planning, trial operation, marketing. - A few buyers started up-country buying stations to cut the quality issue at the early stage. This is similar initiative, but driven from the bottom of supply chain. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers - Exporters <p>Executor:</p> <ul style="list-style-type: none"> - Prov. & Kab. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - BIPP - Private & third sectors (e.g. UNHAS)

	Contribution to the employment creation at the community level is also expected.	
Improvement of farmers' selling prices through regional auction system	<ul style="list-style-type: none"> - Government can support to establish trading floor at each district capital, and start regional auction for cocoa between farmers' organizations and buyers for more transparent trade of cocoa. Possible direction of auction system will be an introduction of transaction by type (fermented or non-fermented) and grade. - One possible case for study is cocoa auction in Sumatra. The action includes the study visit to this auction site. 	<p>Beneficiary:</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - Prov. Kab. DISPERINDAG <p>Supporter (operation):</p> <ul style="list-style-type: none"> - ASKINDO - Cocoa farmers assoc.

(4) Market penetration and promotion of local processing industry

Title	Brief Description	Direct beneficiary Executor, Supporter
Strengthening of export promotion services for processing industry	<ul style="list-style-type: none"> - Though cocoa product marketing needs very profound knowledge on products and customers, there are still rooms for public sector to render export promotion service. But the present capacity and service of the government in charge are not enough to meet an expectation of cocoa processors. - Service lines to be strengthened for cocoa sector include detailed market information service, exploration and matching service for potential buyers, selling visits to overseas agents. - All of these can be targeted for the growing markets such as China, India, Middle-east. Visit to overseas agents can be subsidized and carefully planned in cooperation with processors' association. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Local processors - Exporters <p>Executor:</p> <ul style="list-style-type: none"> - Prov. DISPERINDAG - Regional Export Training and Promotion Center (RETPC)
Study on domestic market for cocoa products and data-base development of domestic users	<ul style="list-style-type: none"> - Though potential of domestic market for cocoa products is considered as large, the market is hardly analyzed in depth. - For the local processors' benefit, features of the market such as the potential size, governance, preferences, prices, and the future growth should be studied. - As well as domestic market study, data and profiles on the users of cocoa products can be collected and managed by the processors associations. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Local processors <p>Executor:</p> <ul style="list-style-type: none"> - Cocoa industry assoc. (APIKCI or AIKI) <p>Supporter:</p> <ul style="list-style-type: none"> - Prov. DISPERINDAG - DOI
Investment promotion of small to medium-scale cocoa processing plants through incentive measures	<ul style="list-style-type: none"> - Following the fresh initiative to invest in small-scale processing plant in Southeast Sulawesi, the government can consider the possibility to introduce incentive measures specially dedicated to investment for small-scale and farmers' led processing factories. - Special incentive measures can be presented by the discretion of Prov. 	<p>Beneficiary</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - Prov. Government - Prov. BKPM

	<p>government, in case the new plant is shared more than half by farmers.</p> <ul style="list-style-type: none"> - Incentive measures can include tax exemption, government guarantee on bank loans and land preparation, and will be announced via regional BKPM. 	
Development of special variety for niche market	<ul style="list-style-type: none"> - In Sulawesi, bulk beans falling into the discounted FAQ is prevailing, there is no plantation for fine beans. The market for fine beans exists for offering premium prices, though very small in size. - The action to study the possibility of such distinctive variety in South Sulawesi and conduct R&D and trial plantation is of worth. This action will be followed by transfer of seedlings to the intending farmers. 	<p>Beneficiary</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - ICCRI & Prov. DISBUN <p>Supporter:</p> <ul style="list-style-type: none"> - Overseas R&D
Promotion of “by-product” development and marketing	<ul style="list-style-type: none"> - The remnants like husks and pulps of cocoa can be utilized for by-products, but have been not practiced. Examples include soft drinks (from cocoa pulp), potash for soap (from pod husk), pectin for jam and marmalade (from cocoa pulp), and organic mulch (from shells). - The action include the workshop inviting cocoa farmers / industrial associations, government to discuss the possibility of by-product development, identification of the partners, technical guidance, trial production, support for market study by the participated partners. 	<p>Beneficiary</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - Private sector - Prov. DISPERINDAG <p>Supporter:</p> <ul style="list-style-type: none"> - Private & third sectors (e.g. UNHAS) - ICCRI
Suspension of import duty on foreign beans	<ul style="list-style-type: none"> - Though controversial, the present import duty on cocoa beans may inhibit local processors from using more imported quality beans (in terms of flavor and fat yield), thus adversely affecting the operation of local processors. Temporary suspension on this duty is recommended to see the impacts on local processors. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Local processor <p>Executor:</p> <ul style="list-style-type: none"> - DOF, Dept. of Trade <p>Supporter:</p> <ul style="list-style-type: none"> - Cocoa industry assoc.
Study on effectiveness and impacts of export tax (and import duty) on beans	<ul style="list-style-type: none"> - Imposition of export tax on beans is being planned in view of encouraging local processors. But an implication of tax can be repercussion to the farmers’ behavior, causing further decline in production. - Since the detailed analysis on this aspect is not seen yet, the government must make this point accountable though the study by the expert. 	<p>Direct beneficiary:</p> <p>--</p> <p>Executor:</p> <ul style="list-style-type: none"> - DOF, Dept. of Trade <p>Supporter:</p> <ul style="list-style-type: none"> - Cocoa Commission - All cocoa related assoc.

(5) Empowerment of farmers’ organization and their access to finance

Title	Brief Description	Direct beneficiary Executor, Supporter
Training on business management skill for	- Successful farmers’ organizations are characterized with a business oriented	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers

the farmers' organizations	<p>operation, sound financial arrangement (saving system), collective marketing.</p> <ul style="list-style-type: none"> - When farmers' organizations are to start or strengthen collective actions, they should develop business-oriented structure and culture through training. Training includes business planning, accounting, and cooperative law. 	<p>Executor: - Prov. & Kab. DISBUN</p> <p>Supporter: - BIPP - Private & third sectors (e.g. UNHAS, BDS)</p>
Study visit to the advanced farmers' organizations	<ul style="list-style-type: none"> - Information on good practice of farmers' organization has hardly been shared by the extension officers and farmers. - Therefore, it is of value to conduct study visit to learn from the collective actions of advanced farmers' organizations, in order to learn the background and type of collective action, management structure, leadership and membership, and financial arrangement. - In addition to study visit, the seminar and forum on good practice of farmers' organization can be planned. 	<p>Direct beneficiary: - Cocoa farmers</p> <p>Executor: - Prov. & Kab. DISBUN</p> <p>Supporter: - BIPP - Private & third sectors (e.g. UNHAS, BDS)</p>
Extension of Sertifikasi Massal Swadaya (SMS) program	<ul style="list-style-type: none"> - Prov. government started SMS program where credits are given to farmers for registration of their land, but the scale of the program is still limited. - Since the holding of land certificate is a critical for access to finance, government needs to extend the present scale of program to accommodate more number of farmers, and make efforts to lower the necessary charges in parallel. 	<p>Direct beneficiary: - Cocoa farmers</p> <p>Executor: - Prov. Government</p> <p>Supporter: - Regional Gov. Bank (BPD) - Agency for Land Certificate</p>
Socialization of Estate Rehabilitation Credit Scheme with associated support program (KPEN-RP)	<ul style="list-style-type: none"> - BRI started the concessionary loan scheme to assist cocoa farmers to replant and rehabilitate their plantations. - Though the scheme is ready, BRI is still expected to socialize this throughout farmers together with DISBUN, and assist farmers to access to the scheme in collaboration with KKMB consultants. 	<p>Direct beneficiary: - Cocoa farmers</p> <p>Executor: - BRI</p> <p>Supporter: - Kab. DISBUN - KKMB consultants</p>

(6) Improvement of public services

Title	Brief Description	Direct beneficiary Executor, Supporter
Improvement of statistical information on cocoa farming	<ul style="list-style-type: none"> - There is a large gap in cocoa production figures between what the government statistics reports (DISBUN) and what ICCO announces (and private sector perceives). Referring to bean export data, the figures of ICCO and private sector seem to tell the actual condition, while government data seem over-estimated, thus deriving optimistic yields. - Cocoa plays the most vital role in South Sulawesi economy. In view of adequate policy-making, the action to improve the 	<p>Beneficiary: - Whole cocoa sector</p> <p>Executor: - Prov. & Kab. DISBUN - Prov. Statistical Office</p>

	<p>statistics is quite essential to grasp the actual performance of cocoa sector.</p>	
<p>Preparation of cocoa plantation map and database</p>	<ul style="list-style-type: none"> - Similar to above, private sector have more prepared mapping data on cocoa plantation, but the coverage of data still seems limited to the area, which each of them cover under their trading network. - To realize effective extension service, the action to develop the database map of cocoa plantation in each district is needed. Data shall contain the planted area per holder, intensity and age of plantation, yield, status of re-plantation and rehabilitation, e.g. 	<p>Beneficiary:</p> <ul style="list-style-type: none"> - Whole cocoa sector <p>Executor:</p> <ul style="list-style-type: none"> - Prov. & Kab. DISBUN
<p>Strengthening of outreach capacity of R&D institution</p>	<ul style="list-style-type: none"> - Little on-farm research carried out by ICCRI in Sulawesi, its outreach capacity to provide expected services in Sulawesi needs to be strengthened. - The action includes the enhanced release of the superior stock to regenerate cocoa plantation base, preparation of guideline on area-specific application of fertilizers, on-farm research on post-harvest (fermentation and drying) and farm management practices, all of which should focus on Sulawesi and its beans. - During the course, measures to develop “extension-research” link will be tested, including the study on establishment of ICCRI’s branch in Makassar or the regular dialogue between ICCRI and Prov. DISBUN, BTPT. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers <p>Executor:</p> <ul style="list-style-type: none"> - ICCRI - Prov. DISBUN - BTPT
<p>Strengthening of BIPP functions and extension service</p>	<ul style="list-style-type: none"> - Regular extension service for farmers is a responsibility of BIPP. But knowledge and opportunity of training on cocoa plantation are limited. - The action to strengthen the functions of BIPP is required to deliver quality extension services to many un-facilitated farmers. Activities include a review of its service lines, staff redeployment, intensive training on cocoa plantation, and preparation of required equipment. - This action needs close coordination with DISBUN as to how optimal cooperation is realized and to build effective linkage with R&D arms like ICCRI and BTPT. 	<p>Direct beneficiary:</p> <ul style="list-style-type: none"> - Cocoa farmers <p>Executor:</p> <ul style="list-style-type: none"> - BIPP <p>Supporter:</p> <ul style="list-style-type: none"> - DOA - Prov. & Kab. DISBUN

4.4 Proposed Program for Assistance

The above action plans required for cocoa sector of South Sulawesi (and Sulawesi as a whole) can be grouped into the program for each stage of supply chain, including production, post-harvest and trading, processing and export, and for the whole supply chain. Action plans are also staged for the short (one to two years), mid (three to five years), and long-term (five to ten years), considering their urgency and importance.

Program for production	<u>Short-term (1 to 2 years)</u> - Acceleration of re-plantation and rehabilitation program (Enhanced facilitation service to assist farmers' access to BRI' s re-plantation loan scheme) - Improvement of the existing cocoa farm productivity through socialization of good farming practices <u>Mid-term (3 to 5 years)</u> - Improvement of planting material supply system (village-based nursery)
Program for post-harvest & trading	<u>Mid-term (3 to 5 years)</u> - Support for establishment and operation of community-based marketing stations (optional action) <u>Long-term (5 to 10 years)</u> - Improvement of farmers' selling prices through regional auction system <u>Short-term (1 to 2 years)</u> - Matching support for supply of fermented beans between farmers and local processors
Program for processing and export promotion	<u>Mid-term (3 to 5 years)</u> - Promotion of "by-product" development and marketing <u>Short-term (1 to 2 years)</u> - Study on domestic market for cocoa products and database development of domestic users <u>Mid-term (3 to 5 years)</u> - Investment promotion of small to medium-scale cocoa processing plants through incentive measures - Strengthening of export promotion services for processing industry
Program for the whole cocoa sector in South Sulawesi / Sulawesi	<u>Short-term (1 to 2 years)</u> - Development of pest and disease-resistant variety - Strengthening of BIPP functions and extension service - Preparation of cocoa plantation map and database <u>Mid-term (3 to 5 years)</u> - Strengthening of outreach capacity of R&D institution - Improvement of statistical information on cocoa farming <u>Long-term (5 to 10 years)</u> - Development of special variety for niche market
Regulatory improvement	<u>Short-term (1 to 2 years)</u> - Study on effectiveness and impacts of export tax on cocoa beans <u>Mid-term (3 to 5 years)</u> - Suspension of import duty on foreign beans

Chart for the above programs is described in the next page.

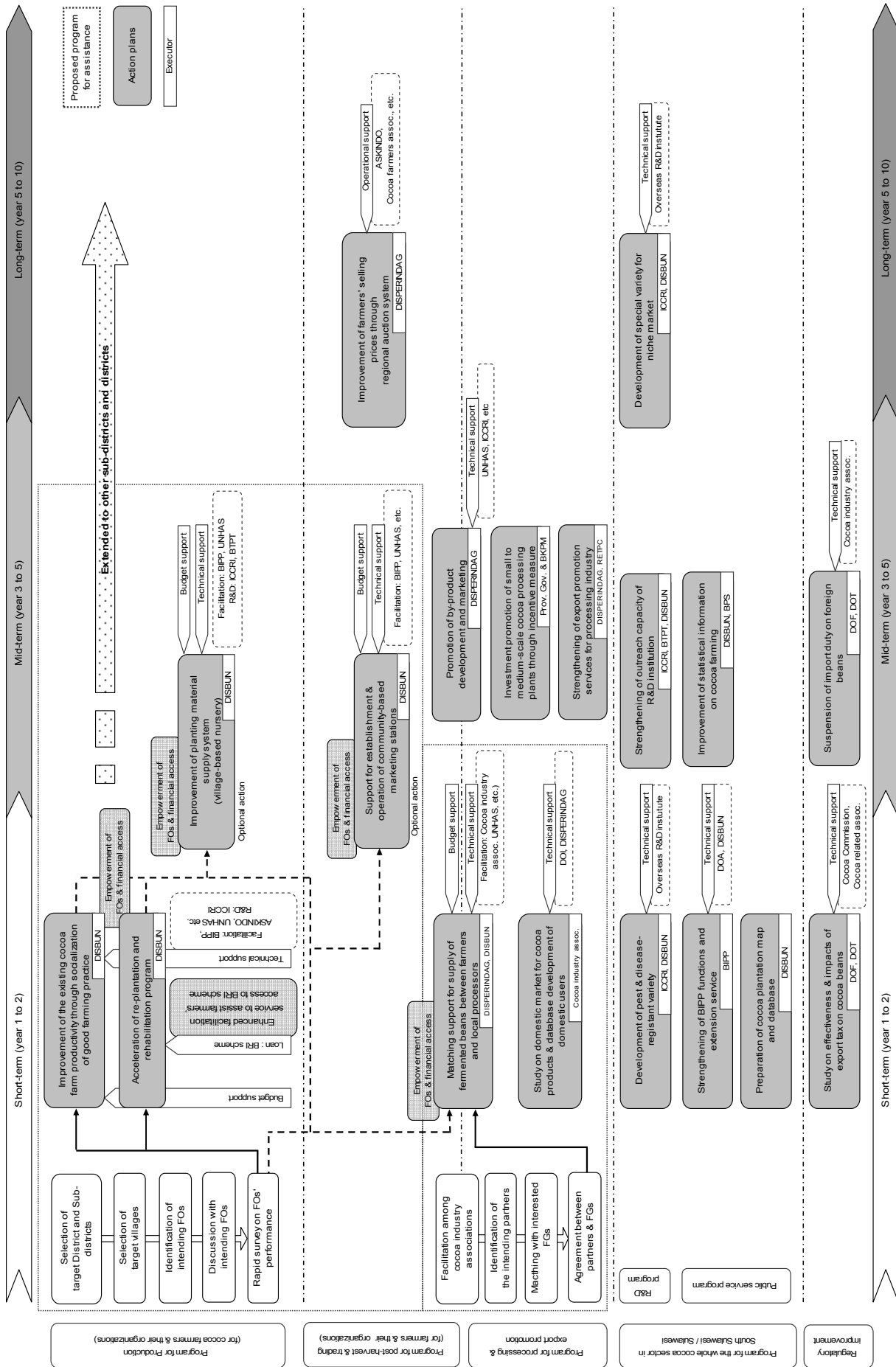


Figure 22 Chart of the Programs for Sulawesi Cocoa Sector

Among the above programs, the following two areas are considered as relevant for providing assistance.

(1) Assistance program for production

Every stakeholder agrees that the biggest issue of cocoa sector in South Sulawesi (and Sulawesi as a whole) lies in the stage of cocoa bean production, where the vicious cycle of decline in productivity and decreasing supply of quality beans has been prevailing. As a result, farmers will gain less income from cocoa farming and increasing number of farmers may abandon their plantations. It is apparent that issues in the production stage would consequently affect the performance of export and local processing industries.

Export and processing industries share the view that restoration of cocoa production base together with embeddedness of good farming practices among cocoa farmers is the most primary action, and that the assistance for re-plantation and rehabilitation, and improved farm management would automatically contribute to the promotion of export and processing industries in South Sulawesi.

Accordingly, **the program for production will have most importance, and be given the higher priority for assistance.** It is desirable that this assistance program be commenced by provincial and district DISBUN at one or two selected districts and their sub-districts, where the similar assistances are not rendered in a large scale. In the selected sub-districts, the villages and intending farmers' organizations will be identified as the recipients, followed by the rapid survey on the performance of those identified farmers' organizations. Individual farmers' organizations or cluster of them can be involved in the program.

Farmers' organizations or cluster of them then can choose either i) re-plantation and rehabilitation or ii) productivity and quality improvement on their existing plantations, or both of them. For the implementation of the program, planting materials such as seedlings, bud woods, fertilizers are to be provided. In parallel to budget support, technical support will be also provided including facilitation service, technical guidance and R&D support (for selection and supply of seedlings, bud woods, etc.).

Since BRI has prepared Estate Rehabilitation Credit Scheme (KREN-RP) to promote re-plantation and rehabilitation of cocoa farm by smallholder cocoa farmers. Program for production will help socialize and facilitate this scheme among cocoa farmers in the selected districts.

Interested farmers' organizations or cluster of them may proceed to the actions, which bring about an opportunity of further income generation, following the above short-term actions. Further income generation will be realized through i) development of village-based nursery for improvement of planting material supply and ii) establishment of community-based marketing station for farmers' own post-harvest operation (i.e., bean preparation comprising of cleaning, drying, grading and packing).

In case that re-plantation works have been already begun, or good farming practices have been embedded, farmers' organizations or cluster of them can directly participate in such value-adding actions. Both village-based nursery and community-based marketing station will not work, unless production base is being restored and that productivity and quality of beans are being improved.

In common to all the above actions, empowerment support will be rendered to those participating farmers' organizations or cluster of them on business planning, financial and organizational management. The program will also extend a facilitation support, in case the cocoa farmers would like to establish the business-minded organization such as cooperative.

Consolidation of community development efforts

Program for production may follow the model practiced in Cocoa Village Model (CVM), cocoa-based community development supported by ASKINDO in Mamuju district of West Sulawesi Province. CVM is considered as a distinctive initiative in a respect that issues of not only cocoa farm management but also community development are addressed by the recipient farmers' organizations and villages.

A certain portion of increased income as a result of the program (enhanced productivity of cocoa plantation with improved quality) shall be saved by the participating farmers' organizations, and be funded for community development activity such as improvement of feeder road, bridge, health center, community hall, and other social issues. Utilization of such funds can be discussed and decided with the concerning village development council.

(2) Assistance program for processing and export industries

Though both processing and export industries find that the support for cocoa farmers is most essential and beneficial action for their industries, **some different supports are also considered as effective for vitalization and competitiveness building of local processing industry.** Among the actions in the program for processing and export industries, i) matching support for supply of fermented beans between farmers and local processors and ii) study on domestic market for cocoa products and database development of domestic users are considered as relevant for the short-term measures for the assistance.

The majority of local processors presently rely on imported quality beans (from West Africa) for fermented beans to add some extents of flavor to cocoa products. But a few processors come to find the worth of using domestic fermented beans (from Sulawesi or other regions of Indonesia), since the emerging markets like China and India which accommodate cocoa products with lesser flavor attributes are rapidly expanding. Furthermore, the processors recognize that the use of fermented beans would largely reduce the processing losses and improve the plant availability ratio.

On the other hand, cocoa farmers are not aware of such potential needs. It is general that beans are not fermented because financial incentives to do so are not given to farmers. However, a few local processors such as PT. Bumi Tangerang started offering the price differential (premium) for fermented beans, and are potential buyer of them from Sulawesi. In this regard, the assistance program to facilitate the matching the potential demand of processors and supply of farmers can have a rational.

Provincial DISPERINDAG and DISBUN may start the program with facilitation of this matching support scheme for cocoa industry association to explore the potential needs for procurement of domestic fermented beans, followed by identification of the intending local processors (partners), matching with interested farmers' organizations and agreement between two parties. Matching support also includes training of farmers' organizations on

good farming practices, fermentation technique and quality control (to be provided by the partner processors), trial operation, and drafting buying agreement.

Empowerment of participating farmers' organizations (capacity building on business planning, financial and organizational management) and support for establishment of cooperative and other entities shall be attached to the matching support.

In parallel to this matching support, the market potentials for local processed products need to be explored. In this regard, it is recommended that the study on domestic market for cocoa products and database development of domestic users be conducted. Cocoa industry associations such as AIKI or APIKCI are expected to lead the study and database development.

(3) Facilitation service for the assistance program

The above assistance program requires experienced and acquainted local resources for the provision of facilitation service, technical guidance, and training, which have know-how and skills on re-plantation and rehabilitation, good farming practices, and establishment and empowerment of farmers' organization. Candidate sources to provide such resources include public sector such as DISBUN and BIPP, private sector such as ASKINDO, a few exporters and processors, and third sector such as UNHAS and NGOs.

Looking at the recent efforts in Sulawesi cocoa sector, Public-Private-Partnership (collaboration with private or third sectors) is considered as an effective approach for the provision of such facilitation services. However, the needs for strengthening and motivating extension officers in the public sector still exist to realize the wider outreach of support functions, since the resources in the private or third sectors are limited. The program has to assess each source of facilitation services, and identify most relevant and effective partners which match the requirements of the program.

Attachment

Attachment-1
Technical Annex

TECHNICAL ANNEX

1 Description of Cocoa and Cocoa Products

1.1 Growth Habit

Cocoa beans of commerce are the seeds of the tree-species *Theobroma cacao* that belongs to the family Sterculiaceae. The growing conditions required by cocoa tree is fairly precise and the area of cultivation lie within 20 degrees latitude of equator. Within these latitudes, a temperature range of 21 to 32°C and a rainfall of 1,250 to 2,500 mm with a dry season of not more than three months having less than 100 mm per month are required. Soil conditions can vary very considerably but a firm roothold and moisture retention are necessary.

Cocoa tree exhibits unusual growth habit with the main shoot called chupon growing vertically upwards to a height of about 1.5 m to form a jorquette and branch out into 4 to 5 fan branches that grow sideways. The horizontal fan branches grow and branch to form the leafy heads of the tree which, in a cocoa plantation, joins with those of its neighbors to give a dense canopy. The subsequent canopies are formed from new chupons that strike just below the previous jorquette. It is traditional for cocoa to be grown under shade trees as such conditions resemble those in its natural habitat.

Flowering occurs when the cocoa plant are about 3 to 4 years old. Flowers are small, about 15 mm in diameter, and are borne on the trunk and main branches of the tree. They appear in clusters on original sites of leaf stalks that gradually get thickened to form flower cushions. Pollination is by insects of which the most important are the midges. Only a small proportion of the flowers develop into pods since most are either not pollinated or are too many for the tree to support through to maturity, These small pods or cherelles stop growing and die and the condition is known as cherelle wilt..

The fruits are fully developed in 4 to 6 months and there is considerable variation in shape, size, surface texture and color depending on the variety. When they ripen, most pods change color, usually from green or red to yellow or orange. The pod usually measures between 150 to 300 mm in length and consists of an outer husk of fibrous material with 30 to 40 seeds embedded in sweet mucilaginous pulp arranged around the central placenta. Each seed or bean consists of two convoluted and swollen cotyledons (the nib) and a small germ or embryo, all enclosed in a skin and a testa (the shell). Much of the food stored in the nib for development of the seedling consists of a fat known as cocoa butter, which amounts to about half the weight of the dry seed.

1.2 Curing

Curing is the process by which cocoa beans are prepared for the market which requires beans of good flavor potential and keeping qualities. It involves bean fermentation followed by drying of the beans.

(1) Fermentation

It is the first essential step in the development of cocoa flavor precursors. Beans with adhering pulp are removed from the harvested pods and transferred to heaps, boxes or baskets for fermentation to take place. The pulp consists principally of water (80-85%), sugars, proteins,

starch, acids and various inorganic salts. Successful fermentation of cocoa beans is dependent on the high sugar content and therefore harvesting should be carried out when the pod and its contents have fully matured. During fermentation the bean mass heats up as a result of chemical reactions brought about by a succession of micro-organisms leading to draining away much of the pulp as sweating and the death of the germ. Thereafter, many chemical reactions take place inside the bean, particularly the oxidation reactions which continue during drying.

The bean mass will reach an initial temperature of 45°C and remain around 50°C until fermentation is completed. Occasional mixing of the mass is necessary to aerate and to ensure that beans initially on the outside of the heap or box are exposed to the temperature conditions prevailing in the interior. Depending on the type, size and quantity beans as well as the climatic factors, the fermentation period may vary between five to eight days. The chemical changes in cocoa beans during fermentation are summarized below.

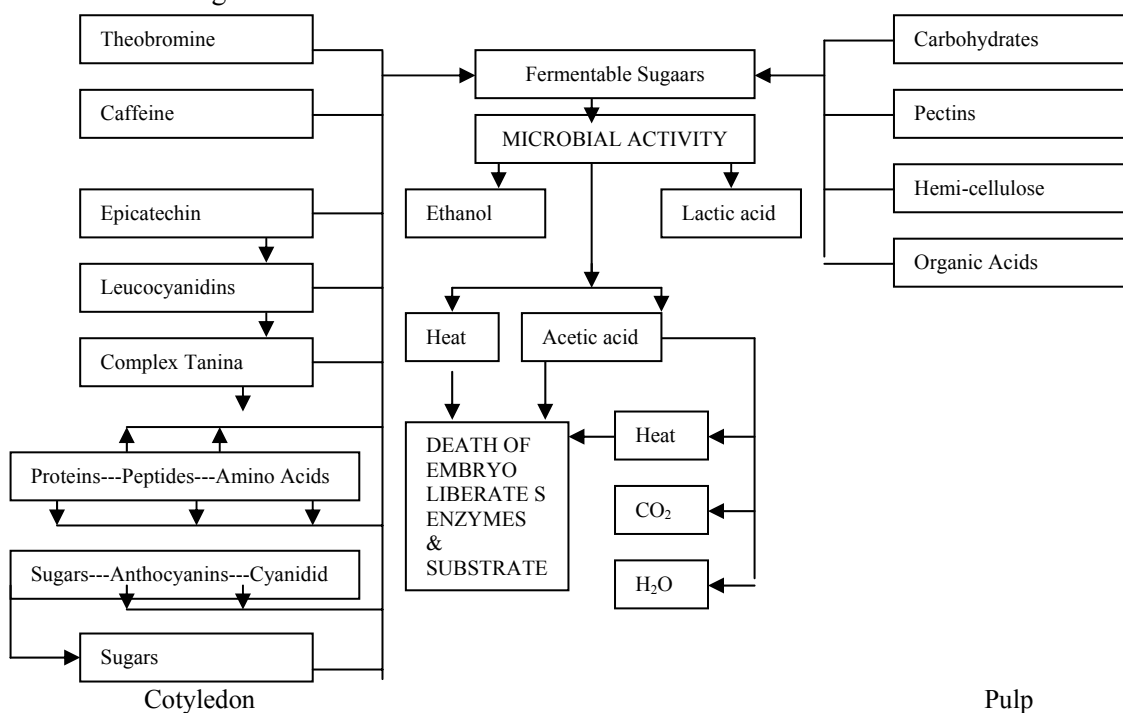


Figure 1 Chemical Changes in Cocoa Bean during Fermentation

(2) Drying

The main objective in drying is to reduce moisture content of the beans to a level which is safe for storage and shipment to their ultimate destination. The oxidative stage of fermentation initiated during the fermentation continues in drying process and plays an important role in reducing bitterness and astringency as well as developing the chocolate brown color of the well fermented beans. The rate of drying is of particular importance as it has an effect on flavor and quality of the dried bean.

Rapid drying may prevent the oxidative changes being completed resulting in excessive acidity while slow drying may expose the beans to mould development. Sun drying is most commonly practiced method where the beans are spread out on concrete drying floors or on mats. Artificial drying is sometimes practiced in large plantation scale operations. For best storage and to meet the stipulated quality standards the beans should be dried to 7% moisture content.

1.3 Processing

Processing of cocoa beans produces the raw materials; cocoa liquor or mass, cocoa butter and cocoa powder, for manufacturing of the end products in chocolate industry. The first stage of bean processing is to clean the beans to remove any foreign materials and to separate small, broken and clustered beans. The cleaned beans are then subjected to roasting, the purpose of which is to develop flavor, the precursors having being formed during fermentation and drying. The temperature and duration of the roast are determined by the type of roaster employed and the requirements of the final product. The roasted beans are next winnowed in order to separate the nib from the shell. The nib is then ground to cocoa mass or liquor which has a fat content of about 55%.

For the production of high fat cocoa powder used in drinking chocolate, the butter content is reduced to 22 to 23% by pressing the liquor in hydraulic presses. The cocoa cake that comes out of the press is then broken down in a mill and the powder sieved through a fine mesh. Cocoa powder may be produced from cocoa liquor or nibs treated with alkali to give alkalized cocoa powder as against the natural cocoa powder. Alkalization improves the flavor, color and dispersability of the final product. For production of cocoa butter and low fat cocoa powders containing 10 to 12% fat, which are used for flavoring in cakes, biscuits, ice creams, and chocolate flavored products, an extrusion press or expeller is used. The expeller cake is broken down in a mill and sieved to obtain low fat cocoa powders and the cocoa butter of industry after filtration. A simplified flow diagram on processing of the cocoa beans to products is shown below.

(1) Detailed steps involved in cocoa processing

Cleaning	<p>Cocoa beans received at the processing plants contain a variety of foreign materials such as dust, sand, wood, stones, glass, polythene, leather and fibrous materials from the jute sacks in which they are packed. The first processing stages involve removing non-cocoa materials and the dried pulp still attached to the shell around the bean, both of which would produce off-flavors as well as damage grinding equipment during further processing.</p> <p>Cleaners use a series of techniques to remove the different types of impurities. These include vibrating screens of varying meshes to remove very large or small particles, air lifts or aspirators to separate stones, dust and shell based on density differences and magnetic separators to remove iron. Besides the extraneous materials, bean clusters and immature beans too are separated at this stage and may be included in bean blends with other winnowing products for expeller pressing to produce cocoa butter.</p>
Roasting	<p>The roasting process governs the final chocolate flavor and aroma which is a critical part of chocolate making. During roasting the moisture content of the bean is reduced and render the shell in a loose condition so that it can readily be removed in the process of winnowing that follows. It is an essential preliminary in the manufacture of chocolate or chocolate products but is less important if the beans are solely required for the expression of cocoa butter.</p> <p>In the roasting process heat is applied evenly over a sufficient period to allow steady penetration through each bean without burning the shell. Traditionally beans were roasted whole, but now the alternatives of nib and liquor roasting are available.</p> <p>The degree of roast varies with the type of bean and the desired cocoa product i.e., cocoa paste, butter or powder. For chocolate production lower roasting employed while for cocoa powder production higher temperatures in the range of 116 to 121°C are applied. Time of roast can vary depending on the</p>

construction of the machine and the size of the batch. The roasting of whole beans has several disadvantages. It produces combustion gases from any remaining foreign materials on the shell and these are detrimental to the flavor of cocoa paste.

In addition, fat may migrate from nib as well as from broken and crushed beans to the shell during roasting, thus reducing the final fat content of the liquor. Because all beans in a batch are not uniform in size, optimization of roasting time to the medium size will cause over roasting of small beans and insufficient roasting of large beans, both of which are detrimental to the final chocolate. In order to aid winnowing of un-roasted beans and to overcome many disadvantages encountered with whole bean roasting, many processors are employing two stage processes for thermal preparation of cocoa beans. Thermal pre-treatment machines employ passage of hot air, saturated steam or infrared treatment to loosen shell from nib.

Winnowing

Cocoa beans are normally broken while they are still hot following roasting or thermal pre-treatment of the whole beans. In the winnowing process, the shell, and in certain circumstances the bean germ is separated as far as possible from the broken nibs. Cocoa bean shells almost always have adhering dried pulp remains containing fine sand. Winnowing machines make use of combined action of sieving and air elutriation to separate the shell loosened by roasting followed by light crushing of the beans which preserves large pieces of nib and shell. The object of the winnowing process is to produce two basic fractions - nib which contains the minimum of shell and germ, and the shell portion. Nibs after winnowing may contain 1.5 to 2.0% of shell and probably a small amount of germ.

Grinding

The next stage in cocoa processing is grinding of the roasted and winnowed nibs from whole bean roast system, thermally treated, winnowed and roasted nibs from nib roast system or thermally treated and winnowed nibs from mass/liquor system. Cocoa nib is of cellular structure with cocoa fat (55%) in solid form locked within the cells. The cell walls are ruptured in the grinding process and frictional heat liquefies the fat. As grinding continues, the particle size is reduced and the paste becomes more and more fluid. Four groups of particles are recognized in nib grinding: shell, germ, cell wall and cell contents. Of these, cell contents (starch, protein) form the major proportion of particles in the finely ground cocoa mass, and are naturally smaller than 0.75 to 1.00×10^{-3} in diameter, and therefore not need to be ground.

Nevertheless, the milling processes does have an effect on the final cocoa paste produced due to reduction of particle size of remaining shell, germ and the cell walls. The nibs are subjected to pre-grinding for which equipment such as hammer, blade, disk and ball mills and extruders are used. Fine grinding which follows pre-grinding employ triple mills and agitator ball mills. Fine refining of cocoa paste is important in production of both cocoa powder and chocolate mass. The fineness requirements of cocoa paste for the production of cocoa powder are greater than those for the production of chocolate. Fineness of cocoa paste determines the fineness of the cocoa powder produced from it.

Liquor (paste) pressing

Two types of machines are used for pressing the cocoa paste produced from the cocoa grinding process. The original vertical hydraulic presses with press pots arranged one above the other have been replaced with the horizontal hydraulic presses. The output from these machines can be adjusted by changing the pressure applied to produce press cake that contain 24% fat for production of high fat cocoa powder or as low as 10% for production of low fat cocoa powders. The cocoa butter extracted from hydraulic presses is not quite free from cocoa material and up to 1% may be in suspension. This is removed by filtration in filter presses or by centrifugal de-sludging.

Extrusion, expeller or screw presses are also used in production of cocoa

butter from whole beans and blends of winnowing products consisting of fine nib dust, small nib, and immature beans. The principle in this type of pressing is to force the material to be extracted into a tapering tube by means of a rotating screw. The material passing through the press is subjected to a combination of shearing and increasing pressure forcing out the fat through the slits. The cake is extruded through the gap at the end of the press in the form of thick flakes. The fat contains some fine cocoa and must be filtered or centrifugally separated. The extrusion process is more efficient in extraction of fat and the fat content of the cake can be reduced to 8 to 9% level.

Cocoa grinding During hydraulic pressing, particles of cocoa matter and the residual fat become very densely compacted and hard press cake, particularly if the fat content is low. The press cake is passed through a breaker to break the cake into lumps. The lumps are further reduced by passing through hammer mills or peg disintegrators, working in conjunction with rotating silk or wire screens. The true particle size of cocoa material is that which was achieved during the grinding stage. The presence of butter in the cake necessitates use of cooling air since rise in the temperature beyond 34°C will cause the butter to melt and clog the machines. The effect is more noticeable with cakes containing higher fat content. Further, careful control of the temperature in the cake pulverizer is important to obtain good powder colors.

Alkalization Alkalization is used mainly to improve color and flavor, and the process consists of treatment of the beans, liquor, nib or powder with solutions or suspensions of alkali, usually in the form of potassium or sodium carbonate. Alkalization of liquor is the most widely practiced where higher concentrations of K₂CO₃ than with nib are used to produce sandy-brown cocoas. In alkalization of cake, low fat cake is used. Cocoa powder produced from expeller cake is characterized by flavor generally inferior and less refined.

(2) Products of cocoa processing

Cocoa paste (mass) Cocoa paste is the ingredient in chocolate, whether milk or dark, that gives its flavor and aroma. The fineness of the liquor must be such that no grittiness will be felt in the mouth when eating or drinking products containing cocoa powder. Cocoa paste may differ in bean blend, fineness, fat content, microbiological condition, etc. In order to maintain the consistency of quality, cocoa pastes produced from beans of known quality from different sources are sometimes blended. Some manufacturers produce two basic types of cocoa paste: one for making chocolate and another for pressing to cocoa cake/powder. Cocoa paste for latter purpose must be at its final fineness following milling.

When cocoa paste is stored for long period or transported in solid form, it is usually packed into 25 to 30 kg 3-ply corrugated Kraft-paper boxes with polythene liner or bag inside. It has a good shelf life as the fat is highly saturated and the cocoa solids contain powerful natural antioxidants.

Cocoa butter Cocoa butter is extracted by several methods giving products of different grades. Following is a brief description of the grades of commercial cocoa butter and fat. These methods of extracting the butter and fat are illustrated in a schematic floor diagram below.

Prime Pressed Cocoa Butter Fat obtained from good quality cocoa nibs commercially free from shell by means of mechanical (hydraulic) pressing. No subsequent refining other than filtration is employed. It is light yellow completely liquid fat and displays marked tendency to super-cool, which is important in the processes of chocolate molding and enrobing.

Expeller Pressed Cocoa Butter In expeller, extrusion or screw press slightly different conditions prevail during extraction and the cocoa butter obtained can be very mild and floral, compared to the prime pressed, if raw beans are used.

Solvent
Extracted/Refined
Cocoa Butter

This is the fat extracted from the cake residues after expeller process or it may be extracted from cocoa waste. Solvent extracted cocoa butter must always be subjected to a refining process.

Cocoa butter has a low content of unsaturated fatty acids, especially of polyunsaturated ones. Therefore the shelf life of the fat is relatively good. Like paste, cocoa butter is usually packed into 25 kg 3 ply corrugated cartons with inner polythene liner or bag for transportation and shipment to processors in containers.

Cocoa powder

There are three main methods for the production of cocoa powder. Processes adopted in these methods can be modified to give cocoa powder of different flavor, color or degree of fineness by altering the temperature of roasting, strength of alkali, or method of grinding.

Liquor Process: The liquor is subjected to hydraulic pressing where the cocoa butter content of the liquor is reduced from around 55% to a cocoa cake which may have a fat content ranging from approximately 12 to 25 % according to how cocoa is to be used. The press cake is a solid compressed mass which is ground and sieved to give cocoa powder. The cocoa powder produced is called natural cocoa powder and is used for the preparation of cake coatings and chocolate flavored products where a mild flavor is required.

Alkalization Process: The nib is soaked in warm alkali solutions, dried and ground to liquor before subjecting it to hydraulic pressing as in the liquor process. Alkalized liquors produce strong flavors and much darker and redder colors in alkalized cocoa powder.

Expeller Process: In the expeller or extrusion process, the steamed nib (5 to 6% moisture) is fed to the expeller press where the fat content can be reduced to less than 12% if required. The action of this press is one of shearing and the nib particles are torn rather than ground and the cake issuing from the press is in the form of thick flakes. This cake needs grinding to produce a fine powder. It is possible to alkalyze cake before grinding, but this entails extra drying. The particle size of expeller cocoa powder is different from cocoa powder from hydraulic presses.

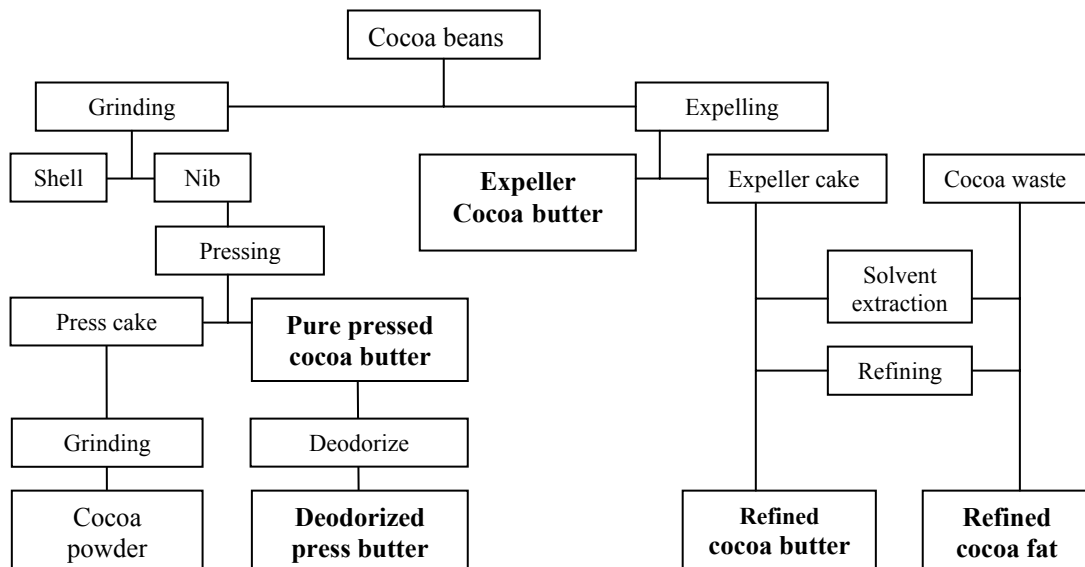


Figure 2 Different Methods of Extracting Cocoa Butter

2 History of Cocoa Plantation

2.1 Consumption

Cocoa trees were cultivated by Aztecs of Mexico long before the arrival of the Europeans. The chocolate was prepared by roasting the cocoa beans and grinding them between stones before mixing with other ingredients such as spices and honey to make a drink of frothy consistency. The first cocoa beans were brought to Europe by Columbus as a curiosity, but were later exploited commercially by Don Cortes as a new drink. The process to extract the cocoa butter, first developed by Van Houten of Holland in 1828, led to the wide variety of products available today. The separation of the cocoa butter from the bean produced a powder containing 22 to 24% fat which was easier to prepare and digest as well as more palatable and cheaper. Though cocoa powder is not soluble, the product came to be known as soluble fat due to its excellent dispersion properties.

The sold form of milk chocolate is attributed to Daniel Peters of Switzerland in 1876, and the Swiss had a virtual monopoly in of milk chocolates until Cadbury's Dairy Milk chocolate was introduced in 1904, and later by other manufacturers in Europe and North America. If cocoa grindings is taken as a measure of consumption, 3.4 million tons were consumed in 2005/06, as shown below.

2.2 Cultivation and Production

After the conquest of Mexico cocoa cultivation spread to Caribbean islands and parts of South America, but Mexico remained the major producer of cocoa beans until the seventeenth century. Apart from the movement within the Caribbean area, cocoa was taken across the Pacific to Philippines about the year 1600. From there it spread later to Sulawesi and Java in Indonesia. Cocoa was introduced to Africa during late eighteenth century, first to Cameroon and to other nations, notably, Ghana and Ivory Coast.

The African farmers undertook planting of cocoa at a remarkable speed that by 1900, Ghana took the leading position in cocoa production, a position they held by a large margin till the 1970s. Ivory Coast was initially slow to develop its cocoa, but production increased rapidly in the 1970s to become world largest producer of cocoa. The British Government in 1950s, concerned about possible West African supplies due to swollen shoot disease, established plantations in Peninsular Malaysia. By late 1960s, trial plantations in the west coast had given satisfactory results and large scale plantings were undertaken, mostly inter-planting on old coconut estates and later as a sole crop as a diversification from rubber.

2.3 Types and Varieties of Cocoa

Cocoa is generally considered to consist of three main types or groups, namely, Criollo, Forastero and Trinitario. The distinguishing characters of the cocoa types are shown in Table 1. Criollo beans ferment faster and in the past reported to have a highly regarded, but usually weak, chocolate flavor. Criollos typically lacked vigor and jorquette, were susceptible to diseases and today only a few, if indeed any, pure stands exist.

Forastero is a large group that contains cultivated, semi-wild and wild populations, of which the Amelonado populations are the most extensively planted. Amelonados are planted in West Africa (excluding Cameroon) and are predominantly of uniform in type. The pod is light green and usually smooth. The average number of beans per pod is around 40 and the beans are dark purple. It is a hardy and productive type, although slow to come into production by present day standards.

Table 1 Main Distinctive Characters of Cocoa

	Criollo	Forastero	Trinitario
Pod Husk			
Texture	Soft	Hard	Mostly hard
Color	Red occurs	Green	Variable
Beans			
Av. no. per pod	20 - 30	30 or more	30 or more
Color of nib	White, ivory or very pale purple	Pale or deep purple	Variable, white beans rare

Trinitarios are considered to have descended from an initial cross between Criollo and Forastero, usually Amelonado trees. They exhibit features of both parents and are first cross gives very vigorous, prolific, hardy trees but the vigor declines after few generations. They vary in pod and bean characters because the parents have highly contrasting characters.

An exceptional case with regard to the type of cocoa is reported in Java. Around 1900, the management of the Djati Roenggo plantation in Central Java introduced a seedling from Venezuela that was expected to be the Venezuelan Criollo type, famous at the time for its superior quality. But it was later found that the plant was a Venezuelan Trinitario when it started to bear pods with purple beans. A field was planted with open pollinated progeny and eventually a number of trees with white beans were identified. It is believed that the DR clones (named after Djati Roenggo plantation) of Java originated from selections made from this population and are characterized by soft pod husk, red or green pod color and white cotyledons which are all Criollo characters.

3 Bean Quality

3.1 Fine and Bulk Cocoas

Quality aspects of cocoa bean can be divided into two categories, those covered by grading standards, food regulations and the hardness of cocoa butter that affect the flavor, purity and grade and those governing the physical characteristics that affect the yield of edible material which a manufacturer can get from a particular parcel.

The flavor developed from cocoa beans varies considerably, being largely influenced by the variety of the tree and the method of preparation. Based on the type of tree from which the beans originate, they are broadly divided into 'fine grade' cocoas and 'bulk' cocoas. Fine grade cocoa are produced from Criollo or Trinitario trees, Criollo beans giving a mild nutty flavor, while Trinitario beans have a full chocolate flavor with a certain fruitiness or other ancillary flavor. The East Java beans produced from trees cloned from the original DR varieties are of the fine cocoa grade. It is estimated that the supply of fine grade cocoas is only about 2 to 4% of the world production.

Ordinary cocoas, most of them of good quality, are known as bulk cocoas and form about 95% of the world production. They are produced from Forastero trees, nearly all from Amelonado, Amazon and hybrids. Cocoa bulk beans produced in Indonesia are largely unfermented with little flavor characteristics and are used mainly for their fat content. For this reason, they are sometimes referred to as 'fat beans'.

3.2 Off-flavors

The major off-flavors that can occur in cocoa are those due to mould, smoke, under-fermentation and acidity.

(1) Moulds

Internal mould is the most important cause of off-flavor because it cannot be removed during bean processing or product manufacture. Moulds can also increase the Free Fatty Acids (FFA) content of cocoa butter which causes it to soften. Though some mould are destroyed at fermentation temperatures beyond 45°C, prolonged fermentation and drying, and humid storage conditions can promote mould growth.

(2) Smoke

The distinctive off-flavors described as smoky are usually attributed to contamination by smoke during drying or storage. Smoky flavors are very difficult to remove in processing or manufacturing.

(3) Under fermentation

Beans which are dried without being fermented at all, as in the case of Sulawesi, have a characteristic slaty-color of the cotyledons and a cheesy texture. Slaty beans have none of the precursors of chocolate flavor and chocolate made from them has a bitter, astringent and thoroughly unpleasant flavor. Beans which are under fermented will have some chocolate flavor but they will also have bitter and astringent flavors due to presence of unchanged anthocyanins which gives a bright purple color on the cotyledon.

3.3 Acidity

All cocoas are acidic to some degree, most to an extent that is acceptable for chocolate manufacture. Excessive acidity of beans will adversely affect the flavor of the finished chocolate and is unacceptable to many customers. Cocoa beans produced in South East Asian countries, including Indonesia, are noted for their high degree of acidity. The most important among the substances that causes acidity in beans are citric, acetic and lactic acids. Citric acid is present in fresh beans at 1-2 % and about half disappears during fermentation in the sweating or is metabolized, leaving about 0.5% in dried beans. Most of the acetic acid present in the dried bean is dispelled during full factory processing of beans and chocolate, after which little or no acid flavor remains. On the other hand, lactic acid is non-volatile and is not dispelled during processing and manufacturing leaving an acid flavor in the finished product. The percentages of acids in dried beans from different countries are compared below;

Table 2 Acid Content of Dried Beans

Country	Acid in dried beans (%)	
	Acetic	Lactic
Ghana	0.40	0.05
Nigeria	0.17	0.09
Brazil	0.21	0.13
Trinidad	0.66	0.19
Papua New Guinea	0.86	0.65
Malaysia	1.08	0.67

Source: Wood (1980)

Thus, there are appreciable differences between West African and the acid beans of South East Asian countries in terms of pH, smell and taste. These differences are related to the presence of larger amounts of acetic and lactic acids and these in turn arise from larger amounts of pulp and sugars. The differences have been reduced considerably in Malaysia by removing a proportion of pulp by applying pressure to the mass before fermentation. In some instances, oxidization of the acetic acid has been tried after fermentation with good results. Research on the causes for the differences in the acid content in beans from different sources has so far been inconclusive.

3.4 Cocoa Butter Hardness

Cocoa butter is made up of a mixture fatty acids and triglycerides. The typical fatty acid composition of West African cocoa butter is as follows;

Palmatic	25.3%
Stearic	36.6%
Oleic	33.3%
Linoleic	2.8%
Other fatty acids	2.0%

This type of cocoa butter will have the physical properties required for making chocolate: a melting point about body temperature and relative hardness at room temperature. The composition of cocoa fat can vary depending on country and season. The cocoa butter from Indonesian beans seems to have a higher proportion of saturated fatty acids (palmatic and stearic) to unsaturated fatty acids (linoleic and oleic) giving it the higher melting point and thus a hard fat. This character is sometimes favored by some manufacturers as soft cocoa with low melting point can be improved by mixing with the hard fat to give a stable finished product.

Among other important quality characters is the purity of the material which implies the absence of contaminants, an area that national and international regulations play an increasingly restrictive role.