UNIVERSITY OF GHANA

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HISTORY OF THE COCOA RESEARCH INSTITUTE OF GHANA, TAFO 1938-2008

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DECLARATION

I declare that except for references to works which have been appropriately acknowledged, this thesis is my original research and that it has neither in part nor whole been previously presented for another degree in any institution.

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DEDICATION

I dedicate this work to my lovely wife Korlekie and children Oko-Bacha, Tetteh Ablakwah and Teye Amponsah for their immense support and prayers, and all loved ones especially my parents.

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I bear sole responsibility for any mistake yet remaining in this work.

ABSTRACT

The cocoa industry became the mainstay of Ghana's economy since its introduction in the country in the late 19th century. The industry spread quickly from its original base at Akuapem through Akim to many parts of the country making Ghana the leading producer of cocoa by 1910. However, the industry was faced with a near collapse in the 1930s due to the emergence of the deadly swollen shoot disease that was fast destroying many farms. This compelled the colonial administration to establish the Central Research Station at Akim Tafo which later became the Cocoa Research Institute of Ghana (CRIG). They were mandated to deal with the situation and study to provide innovative ways of cultivating the crop in order to increase production. Research activities at the station in containing the situation whip up farmers interest in the industry in many ways. For example scientific measures were employed in reducing the maturation and fruition period of the original Amelonado Cocoa from seven to three years through hybridization. This research therefore focused on changing the narrative of placing high land, labour and cocoa pricing as responsible for increase in production to the innovative strategies introduced by the Cocoa Research Institute of Ghana (CRIG) through their research activities to make Ghana's cocoa industry vibrant.

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ACRONYMS

PPP	Public Private Partnership
WACRI	West Africa Cocoa Research Institute
CRIG	Cocoa Research Institute of Ghana
PNDCL	Provisional National Defence Council Law
CSSV	Cocoa Swollen Shoot Virus
CNV	Cocoa Necrosis Virus
CSSVDCU	Cocoa Swollen Shoot Virus Control Unit
ERP	Economic Recovery Program
CMB	Cocoa Marketing Board
CPP	Convention People's Party
UGFCC	United Ghana Farmers Council
GDP	Gross Domestic Product
NLC	National Liberation Council
LBC	Licensed Buying Companies
PBC	Produce Buying Company

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CHAPTER ONE

GENERAL INTRODUCTION

Background Study: Context and Argument

The background seeks to do a discourse of cocoa research and development in selected geographical settings of the world. It seeks to bring to fore, the inseparable role of research in the development of the cocoa production in their respective settings. Specifically, the section discusses the role of cocoa research and development in the Caribbean and South America, Africa and the West Africa in general. Further, it established that research and development in cocoa production elsewhere in the world have been pivotal in their development hence the need to embark on a historical treatise of this emerging phenomena.

Olisa Moujama[1] contends that cocoa is one of the three non-alcoholic beverages of world importance. As a beverage, it comes behind tea and coffee in popularity, but only cocoa possesses nutritional value and has non-beverage or food uses of far reaching scope. Cocoa has served as a very essential cash crop around the world for developing countries, as a core part of their international trade and the manufacturing sector of countries. The cocoa crop, as asserted has been ranked as a key economic bean on the international arena and has been useful in several ways especially to countries that produce it and consumers all over the world.[2] The world over, research and development in crop production and the resultant increase in production had been undoubtedly illustrated in

[1] Muojama Olisa, *The Nigerian Cocoa Industry and the International Economy in the 1930s: A World-Systems Approach*. Cambridge Scholars Publishing: Newcastle upon Tyne, 2018.
[2] Ibid

scientific and social discourses.[3] Voluminous digest on Cacao cultivation and Cocoa production have also been devoted as well in this scientific and social discourses. For instance, an account about the frututario cocoa which was derived through the hybridization between the original plantings led to the introduction of the Forastero cacao in the Trinidad and Tobago (T&T). It is on record that by 1830, the T & T was the world's third highest after Venezuela and Ecuador. T&Ts Cacao industry dominated the local economy between 1866 and 1920, a time that the world's demand for cocoa products increased. Subsequently, when at a point in time production and output of coco decreased, the Cocoa Board of T&T was set up in 1945.[4] Hitherto, the Spaniards were the first to plant Criollo cocoa (native) variety in T&T in 1525.[5] An outbreak of "a blast" also called "hurricane" or "Ceratocystis" wilt or "bark canker" phytophthora infection. T&T then introduced the Torastero (exotic) cacao from Venezuela in 1757 which eventually inter-bred the remnant criollo to produce the hybrid cocoa referred to as Trimtario. Bekele laments that "Subsequently, in 1783, cacao cultivation and cocoa production expanded in earnest with the introduction of the Spanish Cedulla of population. The cocoa industry then became prosperous between 1840 and 1866 and further experienced a tremendous boom between 1866 and 1820 since cocoa was traded at a very high price at that time[6] and eventually dominated the economy."[7]

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3 Bekele F. L., *The history of Cocoa Production in Trinidad and Tobago*. 4 – 12 in proceedings of the APASTT Seminar – Exhibition entitled Revitalisation of the Trinidad and Tobago Cocoa industry, 20 September, 2003, St. Augustine, Trinidad, 2004.
4 Ibid.
5 Shepard C.Y., The cacao industry in Trinidad – some economic aspects, Part I. the Government Printing Office. Port of Spain. *Reprinted from Tropical Agriculture* Vol IX4. 95 – 100, 1932.
6 Ibid.
7 Brereton B., *A history of modern Trinidad* 1783 – 1962 Heinemann Educational Books Inc, 262, 1981.

Bekele[8] described the period 1866 - 1920 as the "Golden Years" of cocoa production in T&T. Subsequently, at a point, cocoa became the "financial barometer" of the T&T economy.[9] However, in later years, inefficiency led to a decline in cocoa production in the region.

In West Africa, it is estimated that, two-thirds of world cocoa production originates from West Africa alone. Countries such as Nigeria and Cote D' Ivoire are producing countries in West Africa. Approximately fifty countries in the inter-tropical zone grow cocoa beans, three of which dominate world production especially Côte d'Ivoire and Ghana. According to Olisa Moujama[10], the spread of cocoa production in West Africa, starting from the 1870s, was one of the means by which Nigeria was incorporated into the vortex of the capitalist world economy.

This probably made 1970/71 the 'golden season' of the cocoa production in Nigeria. This feat Olisa Muojama[11] expatiated was achieved with the assistance of the World Bank under the scheme of Green Revolution which started in the second half of the 1960s, in which the government restored the cocoa production in the 1970s and 1980s through the replanting programmes and the produce price support. After this period, the stagnation became more acute due to the fall in the world cocoa prices in the 1970s, coupled with the effects of the oil boom. "The volume of the cocoa production output declined steadily in the 1980 up to 1987. In 1981, output was 174,000 MT. This declined to 140,000 MT in

8 Bekele F. L., *The history of Cocoa Production in Trinidad and Tobago*. 4 – 12 in proceedings of the APASTT Seminar – Exhibition entitled Revitalisation of the Trinidad and Tobago Cocoa industry, 20 September, 2003, St. Augustine, Trinidad, 2004.
9 Brereton B., *A history of modern Trinidad 1783 – 1962* Heinemann Educational Books Inc, 262, 1981.
10 Muojama O. *The Nigerian Cocoa Industry and the International Economy in the 1930s: A World-Systems Approach*. Cambridge Scholars Publishing: Newcastle upon Tyne, 2018.
11 Ibid

1984 and further to 126,000 MT in 1987. The ratification of the Nigeria Cocoa Marketing Board Ordinance No. 33 of 1947 brought the Nigeria Cocoa Marketing Board into effect from 6th September, 1947. The board was to function as an agency of price stabilization and social development. However, in the colonial period, the board was welfarist, as it provided scholarship for farmers' children at the University College, Ibadan, and sponsored research into the economy of the cocoa industry in Nigeria. It championed the eradication of the swollen-shoot disease and the rehabilitation of the infected areas. It also engaged in the construction and re-alignment of road communications in the cocoa-producing areas. The corruption and exploitation which later characterized the board in the postcolonial period contributed to the fall of the cocoa industry in Nigeria. Following its dissolution in 1986, there was jubilation among the farmers. The complete narratives of the history and activities of the cocoa marketing board in the colonial period have been written in various documents.[12,13,14]

From 1946 to 1958, the Nigerian cocoa production stagnated at about 100,000 tonnes annually.[15] In addition to the activities of the marketing board, the crude oil revolution in Nigeria in the 1960s and 70s had negative impact on the Nigerian agricultural industry, in general. The effects of the oil economy, the activities of the marketing board and other factors made the cocoa industry stagnate. Agricultural Development Projects were a response to the strains that were beginning to appear in Nigerian agriculture in the late

[12] Immanuel Wallerstein, *The Capitalist World-Economy.* London: Cambridge University Press, 1979.
[13] Forbes Munro, *Africa and the International Economy* (London: J.M Dent & Sons, 1976), 11.
[14] Samir Amin, "Underdevelopment and Dependency in Black Africa—Origins and Contemporary Forms," *The Journal of Modern African Studies*, 10, 4 (1972): 511.
[15] Muojama O. *The Nigerian Cocoa Industry and the International Economy in the 1930s: A World-Systems Approach*. Cambridge Scholars Publishing: Newcastle upon Tyne, 2018.

1960s. Thereafter, the production of cocoa increased steadily, reaching a peak of 294, 000 tonnes in the good growing season of 1964-65.

There are a host of studies on the world cocoa economy as well as the West African cocoa industry, however, these studies do not aptly embark on the historiography of the research and development that were exerted into their development and trickled-down to affect the socio-economic lives of people and impacted on gender roles.

Cocoa has been the backbone of Ghana's socio-economic development. It has contributed to her overall GDP since colonial era and post-independence. In contemporary times, the crop contributes to approximately 3.4 per cent to total gross domestic product on yearly basis. It also involves an average of 29 percent of overall revenues derived from export between 1990 and 1999.[16]

It should be reckoned that productivity in the cocoa sector had been stagnating 568000 million tonnes to 160000 million tonnes between 1965 and 1983. However, beyond this period productivity has steadily intensified to about 400000 million tonnes during the late 1990's.[17]

Throughout this journey, the role of innovation and scientific improvement in cocoa varieties which are drought resistant and also produces more yields per hectare have also not been adequately historicise. The role of Ghana Cocoa Research Institute of Ghana (hereafter, CRIG) as the research hub of cocoa production in Ghana cannot be

[16] G.K. Ayenor, A.Van Huis, D. Obeng-Ofori, B. Padi, . & N.G.Röling, "*Facilitating the use of alternative capsid control methods towards sustainable production of organic cocoa in Ghana".* (International Journal of Tropical Insect Science, 2007), 85-94.

[17] M.K. Abekoe, D. Obeng-Ofori, & I.S. Egyir, "*Technography of Cocoa in the Forest Zone of Ghana"*. (Benin: Report presented at the 'Convergence of Sciences' International Workshop, 23–29 March 2002), 29

overemphasized. It is prudent to adopt a more historical approach to assess the triggers, twists and turns of CRIG in Ghana's cocoa production. However, the literature has not delved greatly into the role of CRIG and incremental innovation in Ghana's cocoa industry. This serves as a research gap which requires rigorous and systematic enquiry to unpack how the board has contributed to cocoa productivity using a historical analysis.

Recent conversations in Ghana about factors responsible for increase in cocoa production pay more attention to cocoa pricing and land issues. This study therefore contends that the Cocoa Research Institute of Ghana (CRIG) has contributed greatly to steadily increase in cocoa production and the establishment of a vibrant cocoa industry in Ghana since its establishment in the year 1938. Consequently, the year 2008 marks CRIG's 70th anniversary to innovate cocoa industry in Ghana. CRIG therefore celebrated its 70th anniversary on the theme: *Sustaining the cocoa industry in Ghana* which attests to the fact indeed the establishment's innovative research has stabilized and sustained Ghana's cocoa industry throughout the period. Therefore, a historical enquiry into its innovative research between 1938 and 2008 is worthy of study.[18,]

Historiography

The historiography for this study has been considered under three thematic areas. Specifically, the historiographical analysis will touch on issues such as the state of the cocoa industry, the role of CRIG after its establishment, the impact of CRIG on the socio-economic life of Ghanaians and the cocoa industry as a whole. The rationale of the

[18] CSSVDCU-COCOBOD 2007/2008 Report

historiographical discourse was to establish to the reader that, indeed, there is a pervasive information gap in the literature which serves as a basis for undertaking this study.

Most scholarly works devoted for the study of cocoa and its attending issues in Ghana have subtly touched on the state of the cocoa industry before the institutionalisation and centralisation of research into the golden crop which has determined Ghana's economic prosperity. Scholars like F. Danquah[19] opines that the consequences of the CSSV on the Ghanaian political and economic landscape and society in general has received scanty attention in Ghana's historiography especially in the post-war and post-colonial regimes which he categorically emphasized that it leaves a gap in academic discourses and therefore necessitates that research be undertaken to attempt to fill such an academic gap in the literature or knowledge gap.

The scientific methods devised by plant pathologists and botanists to address the CSSV disease outbreak especially in the eastern province and other cocoa growing areas Danquah emphasized that it is missing outright in African historical narratives and to an extent Ghana's historical discourse. Danquah therefore studied this by blending knowledge from the humanities and natural sciences to explicate how the control of the plant virus unleashed major consequences in the Ghanaian politics, economy and the social space after World War II. Thus Danquah attempted a discussion of the etymology, nature and mode of spread of the CSSVD virus and how interventions were implemented and institutionalised to ameliorate the situation. However, Danquah failed to bring to the fore the state of the cocoa industry before it necessitated the establishment of the CRIG in

[19] Danquah K. F, *Sustaining a West African Cocoa Economy : Agricultural Science and the Swollen Shoot contagion in Ghana, 1936-1965*, African Economic History.(2003) 66.

the country and the centralized nature of research into cocoa and its allied cash crops. Though it blended knowledge from both biosciences and the social sciences, it left a perceived gap in the literature as already indicated and hence the need to embark on such a study. Hence, using data from archival and other primary sources, the study has explored the peculiar situations that was prevailing in the cocoa industry and what motivated the administrators of the country to establish and centralized research into cocoa.[20]

Furthermore, Hymer and Green[21] explored how the Gold Coast peasants cocoa farmers in the wake of propaganda which was propagated by the Gold Coast agricultural department on what should be the best practices in the management of cocoa farms in the era of internationalization of the Gold Coast cocoa, persevered and remained focused on their core business of producing cocoa to meet international demands and to support their livelihood as well. The farmers' effort and resilience, Hymer and Green opine contributed to contain the ravaging effect of the CSSVD. The authors further analysed the role of the Agriculture department and contend that in those days agricultural research was only confined to the importation of exotic plants and observations of such species. On the contrary, what this study conceptualizes as the existing problems and pressing situations that necessitated the establishment and centralisation of research was not touched at all. This is because it attempted to clear the air that it was not true that the indigenous cocoa farmers had no knowledge as far as the management of the cocoa farmstead was concerned.

[20] Ibid,.

[21] Hymer and Green, Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 (1966)

Polly Hills emphasized that the migrant Akuapem farmers were pivotal in the *peasantisation*[22] of the golden crop and migratory routes of these peasants who travelled far into the Akyem forest and later into Ashanti to purchase tracks of land for cultivating cocoa. This assertion Danquah concurred but Hills' further expatiated that though the Akuapems led the way, they were later followed by other peasants from the south of Ghana namely Yilo Krobo, Shai, Ga and Anum/Boso. This is because there was scarcity of land for such agricultural purpose from their various places of abode. Hills' work would be described as an appraisal of the effort and energy invested in the industry by migrant settlers, their modus operandi for acquiring land and capital among others to start their new farms but it failed to describe the situation in the industry before the establishment of a research station. It is this shortfall among others that has motivated this study.

Gareth Austin's[23] scholarly work traces the origin of cocoa into the Gold Coast and Asante to be precise and further enlightened readers on how land, labour and labour arrangement of cocoa farmers changed the traditional economic arrangement hitherto the emergence of the golden crop - cocoa into Asante.[24] Though Gareth accounted for how happening such as swollen shoot disease outbreak, the cocoa hold-ups among others affected the industry, it did not aptly account for the specific happenings within the cocoa industry. This might be attributed possibly to the delimitation of his scholarly enquiry and hence the need for this study to embark on such an inquiry into the situation to provide knowledge to fill this academic gap.

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[22] Fosu-Ankrah made used of the term *peasantisation* to describe the effort of peasant migrant farmer in the cocoa industry in his study titled: Cocoa, Community and the Politics of Belonging in the Aowin Suaman District in the Western Region of Ghana 1962-2008.

[23] Austin, G. *Labour, Land and Capital in Ghana*: University of Rochester Press. 2005 .

[24] Ibid

The past few decade have witnessed substantial historical literature on cocoa production in Ghana. F. Danquah[25] explains measures adopted by the colonial government to solve the outbreak of the cocoa swollen shoot diseases.

He argues that the control of the swollen shoot diseases posed a hard puzzle to the extent that the colonial government through the Department of Agriculture had to follow the US precedent in North America by destroying about 81,000 trees on 300 farms between 1936 and 1937[26]. This, according to F. K. Danquah,[27] was followed by the establishment of a Central Cocoa Research Station at Akim Tafo in 1938 which later became known as West African Cocoa Research Institute in 1944. The purpose of the institute was to find lasting solution to the outbreak of the virus. As part of the measures adopted to combat the disease, the colonial government through its policy of 'compulsion by consent', enacted the Swollen Shoot Disease of Cocoa Order number 148 in December, 1946 resulting in the destruction of more affected cocoa farms.

Danquah[28] contends that the cutting down of large acreages of cocoa farms reduced the income level and the purchasing power of the cocoa farmers to the extent that they could not afford their families expenditure. The Cocoa Swollen Shoot Virus (CSSV) control therefore served to mobilize both urban and rural politicians towards major economic upheavals in the 1947 to 1957 period.[29] The CPP, for example, rode on the back of this upheaval to gain popularity in the rural areas of the country and also brought economic reforms that ended the foreign merchants' dominance on the Ghanaian economy when it

[25] Danquah K. F *Sustaining a West African Cocoa Economy : Agricultural Science and the Swollen Shoot contagion in Ghana, 1936-1965,* African Economic History.(2003) p66
[26] Ibid.46
[27] Ibid. 47
[28] Ibid., 48.
[29] Ibid., 49.

gained power in 1951. He further argues that Kwame Nkrumah's assumption of office in 1951 as the first Prime Minister of the Gold Coast resulted in a greater effort through the Ministry of Agriculture to deal with the virus.

He concluded by saying that though African economies are obviously rural and predominantly agricultural, detailed historical studies of the role of Agricultural Science in the continents development of commercial farming were scarce.[30]

In his article, which was largely based on oral interview conducted with farmers in the Eastern and Western regions of Ghana, Francois Oliver Ruf[31] explains why small holders are now moving to a full cocoa plantation. He argues that farmers have advanced several reasons why cocoa agroforestry is no longer of interest to them. These are the introduction of hybrids of cocoa which do not require shade to grow, and the negative ecological services provided by forest trees. Also, farmers feared the safe haven that the upper strata of shady trees provided for insects and squirrels which caused damage to the cocoa pods. The development of the dreaded blackpod fungus as a result of the presence of shady trees was also worrying to small farm holders. Finally, the West African backing loggers against farmers was clearly a disincentive to any farmer investing in timber trees because for decades the value of timber was kept artificially low.[32]

George Owusu Essegbey and Eugene Ofori-Gyamfi[33] discussed policy reforms in the cocoa industry and the major drivers of these reforms. They explained that government

[30] Ibid., 66
[31] Francois Oliver Ruf, *The Myth of Complex Cocoa Agroforestry. The Case of Ghana*. Springer Human Ecology vol 39.(2011). 377-378
[32] Ibid.
[33] Owusu Essegbey, G and Ofori –Gyamfi, E: *Ghana Cocoa Industry. Analysis from the Innovation System Perspective*; (p283), 2008.

through public institutions such as COCOBOD and its agencies in the last two decades, have provided significant institutional and product innovations to boost the industries' activities.

Among the innovations they identified included the reorganization of the defunct Cocoa Services Division into two separate units and their mandate expanded, the cocoa swollen shoot virus disease (CSSVD) control unit is responsible for the control of the cocoa swollen shoot virus disease (CSSVD). Also, it had an expanded mandate of rehabilitation of old farms (over 30years) and provision of extension services to farmers under Public Private Partnership (PPP). The Seed Production Unit is responsible for the multiplication and distribution of improved cocoa and coffee planting materials to farmers.[34] There was also product innovation to cover the promotion of local consumption of cocoa and the diversifications of cocoa products through the establishment of the New Product Unit.

Commenting on 'the Supply Function of Ghanaian Cocoa, Harrison G Wehner Jnr. highlighted the effects of disease control on the supply of cocoa in Ghana. He argues that, the omission of pests and disease control model in explaining the supply of cocoa is misleading for forecasting and policy purposes because it understates the importance of disease-control measures.

Writing on the *Distribution and Abundance of the Cocoa Shield Bug in Ghana*, E. Owusu-Manu acknowledges that pest increases in number between September and November when young pods were available and decreased between February and April

[34] Ibid., 66

when mature pods were harvested[35]. He therefore advised farmers to begin early management of the disease most especially in September in order to prevent its spread.

Bjorn Beckman acknowledges a decline in cocoa production in Ghana in the 1930's which was attributed to the impact of world economic depression, the new war and the spread of dangerous crop disease; the swollen shoot. However, he identified that production recovered and increased in the late 1950's. But he failed to mention what has contributed to the increase in production which is worthy to say that the establishment of the CRIG in 1938 played a significant role in the increase in production.

Addo Fening[36] observed a great spread of the cultivation of cocoa from Akuapem through New Dwaben into Akyem Abuakwa during the 1880s which resulted in the collapse of the earlier plantations of oil palm and rubber as well as a reduction in food crop production[37]. He emphasized the spread of cocoa throughout Akyem land by the end of the 19th century.

Gareth Austin made a similar argument when he argued that the demise of the previously widespread property rights in people was not only due to the change in the law and its implementation but also in the economy. He explained that the main economic change was the adoption and spread of cocoa-farming. He was of the view that, the demise of pawning of men began during the emergence of cocoa production and before the prohibition of pawning. This, he said, was due to the fact that the new cocoa economy offered alternatives to men who would have accepted being pawned. They would now

[35] Bjorn Beckman, *Organizing the Farmers Cocoa Politics and National Development in Ghana*: The Scandinavian Institute of African Studies Uppsala 1976.
[36] Addo-Fening, *Akyem Abuakwa 1700-1943: From Ofori Panin to Sir Ofori Atta.* Trondheim: Department of History, Norwegian University of Science and Technology, 2001.
[37] Ibid.

become casual workers or cocoa farmers themselves[38]. He established that the spread of cocoa from Akyem land to Ashanti was, to a large extent, due to the emergence of the swollen shoot disease in Akyem, the original centre of cocoa growing which the migrant farmers wanted to avoid. This was because the disease was reducing yield during the period. He further explained that similar to the Akyem farmers, Ashanti farmers also resorted to shifting cultivation method as a means of improving yields.

The forgoing discussion has brought to the fore that indeed there remains a knowledge gap to be filled as most scholarly writings on cocoa have not aptly touched on the fact that there were some peculiar and pressing issues of concern that served as the basis for suggesting a central Cocoa Research Institute for the Gold Coast. After its establishment, CRIG has played admirable roles in the industry and has further contributed to the international reputation of Ghana's cocoa industry which has impacted the lives of Ghanaians.

Research objectives

- To assess the state of the cocoa industry in Ghana before the establishment of CRIG
- To examine the role of the (CRIG) in Ghana's cocoa industry
- To analyse the impact of the (CRIG) on the socio-economic life of Ghanaians in general

[38] Austin, G. *Labour, Land and Capital in Ghana:* University of Rochester Press. 236 -241, 2005 .

Research questions

This research sought to investigate the role and influence of the Cocoa Research Institute (CRIG) on the Ghanaian cocoa industry. Some of the questions this research will be addressing include;

- What was the state of research into cocoa in Ghana before 1938?
- What is the role of the Cocoa Research Institute of Ghana in cocoa production in Ghana?
- How has the research institute impacted on the cocoa industry and the socio-economic life of Ghanaians?

Methodology and Sources

The study was a qualitative research method which has employed the use of both primary and secondary sources. The primary sources involve the use of archival sources from the Public Records and Archival Administration Department (PRAAD) and files of the Cocoa Research Institute of Ghana (CRIG) especially The CRIG Quarterly, newsletters and bulletin. Information from the CRIG Quarterly assisted in supplementing data collected from PRAAD and provided a general understanding into the activities of CRIG. Data was collected from ADM 30/5/33 from PRAAD which contained a report of the colonial Secretary's adviser on Agriculture, Mr Frank Stockdale and Report of the Committee of Inquiry into the Existing Organization and ADM 5/3/76 SPC/V 6835/4,000/10/66-67. Also it conveyed the report on the Methods for the Control of the swollen shoot disease by the compulsory cutting out of infected cocoa trees in 1951. Reports from (ADM.) 5/1/1 *Gold Coast Report of the Blue Book for 1892* by F.M

Hodgson, Colonial Secretary, 29 and PRO CO964/17, Kojo Dukwoh to Secretary of [Watson] Commission, Kumasi 19th April, 1948 equally gave me insight into the subject of enquiry. The documents provided the study an in-depth insight into the *situation problematique* and the agricultural activities was mostly animal production and crop cultivation in the Gold Coast before 1938 and importation of foreign plant species for experimental purposes. The analysis of the state of the cocoa industry before the establishment of the Cocoa Research Institute in the Gold Coast before 1938 was strongly informed and shaped by data collected from these reports.

Oral interviews were conducted to augment the primary data.[39] The study has also engaged other existing secondary sources on cocoa production in Ghana.

The secondary data for the study was obtained from journals, published articles and thesis at the Balme library, African Studies Library, COCOBOD and CRIG libraries among others. The library studies conducted were very crucial because it assisted the study in two different ways. Firstly, the library readings helped the study to be grounded in a theoretical framework. Secondly it shaped the analysis of the impact of the establishment on the cocoa industry and the socio-economic life of Ghanaians at the chapter four.

The personal interviews conducted also provided data to supplement the archival and secondary data sources. For instance, at the chapter four of this thesis, interview data concurred, secondary data on how the industry has impacted the socio-economic life of Ghanaians and the cocoa industry in totality.

[39] Personalities interviewed include Dr Frank Amoah – Executive Director of CRIG on 13th October, 2018, Mr Emmanuel Ewe a Chief Cocoa farmer at Akyem Afosu on the 15th October, 2018, Mr Lloyd Brobbey – the Public Relations Officer at CRIG Tafo on the 14th of October, 2018 and Mr Emmanuel Abayateye Chief Cocoa farmer at Tontro near New Tafo.

The data gathered from the archival and other sources were thematically organised and analysed under the respective research questions to come up with the perspectives discussed in chapter four of this document.

Nevertheless, the retrieval of information from archival sources was bedeviled with challenges such as non-availability of a record captioned with information on the subject I am investigating into. There are situations where you will find a record in the serial or the reference list but archival and records attendants will indicate that such documents can not be traced or they are not available on the shelf.

In addition, the study also draws from oral interviews conducted during my field research with key informants such as cocoa farmers, local/traditional authorities, educationists, businessmen, security officials

The study purposively selected these persons for the data collection. I was able to reach them by referral or snowballing technique. For instance the chief cocoa farmer referred to another person he described as a *veteran cocoa farmer* who also referred me to another in that order. This technique was helpful in the sense that it enabled me to get information-rich participants for the study.

A major challenge I faced with my interviews which reflects in this work was that I could not get female participants to interview to get further perspectives to enrich the study. The lack of information from female respondents though did not limit the achievement of the set objectives. However, the researcher is of the belief that both husbands and their wives equally contributed labour in tilling land for developing cocoa farmsteads. Therefore, these women would also be in a position to account for the innovations which

have been introduced into the industry before and after the institutionalisation of research into the industry.

The interviews were done in English, Twi and Dangme. The choice of language was determined by the language proficiency level of respondents. For instance, the chief cocoa farmer was interviewed in Twi while the interview session with the P.R.O of C.R.I.G. was conducted in English. In the same vein, the interview session at Tontro which a small migrant settlement near Akyem-Tafo was conducted in Dangme because that is the predominant local language in the community.

Interview questions were open-ended questions that generated in-depth information on significant events as well as experiences of participants. All interviews were audio-recorded and stored in my audio archive. The audio transcriptions of interviews conducted in Twi and Dangme were transcribed into printable formats.

Therefore in order not to twist or misrepresent the voices of the informants in the audio, quotes used in this study are direct translations or verbatim. Some transliteration or direct translations were used in quotes where interviews were conducted in Twi or Dangme languages. But the interviews conducted in English were transcribed as exact as respondents said them. In all, three (3) in-depth interviews were conducted to supplement data from secondary sources for the study.

A study is economic history when it attempt to study how past economies have changed and the factors that influence economic development. Its focus is on practical questions about real economies. For instance, how did the centralisation of the CRIG inure economic benefits and how has it affected the socio-economic lives of Ghanaians since

its inception. Economic historians use concepts and theories from across the social sciences to study the historical development of economies and understand them in their social, political and cultural contexts. For instance, this study has been grounded in a theory used by economist to study the impact of innovation, invention and diffusion of technology on development.

Limitation

Usually, in every research endeavour, the researcher is bound to encounter some challenges in the data collection process. The first came from PRAAD during the search; documents sometimes requested for could not be traced by the attendants even though they have been listed in the catalogue. Again, some of the documents were defaced to the extent that it made reading difficult. The study therefore relied on secondary sources to overcome these challenges.

Another challenge came from the oral history information gathering. The Cocoa Research Institute just, like any other public institution in Ghana, finds it difficult releasing some information to the general public not even researchers like me. In view of this, getting their staff to interview was difficult. For example, permission was sought from the executive director to book interview appointment with their public relations officer. Also appointment with the director requires continuous visitation. I dealt with this situation through perseverance by regularly visiting the place to book an appointment. The access to the CRIG library also helped me to get much information about the institution.

Relevance of the study

The popular conversation in the existing literature on cocoa production in Ghana have focussed on attributing the increase in cocoa production and the creation of a vibrant cocoa industry in Ghana to cocoa pricing, land and labour factors. Historians have not paid much attention to the mechanism used in combating the dreaded cocoa swollen shoot contagion and the innovations that were introduced into cocoa through research which has resulted to larger extent in the stabilization of the Ghanaian cocoa industry. This study has highlighted the contribution of the Cocoa Research Institute (CRIG) in the creation of a vibrant cocoa industry in Ghana. It has contributed to the study of the economic history of Ghana and Africa as well as providing useful information to policy makers about the relevance of research in agricultural development.

Theoretical Considerations

A major theory that has been used to study adoption of research and development is the System Innovation theory. Hence, the theoretical framework of this study hinges on the Innovative System theory which was propounded by the Schumpeterian school in the first half of the twentieth century in which he identified three stages of the process as "invention, innovation and diffusion." According to Schumpeter, "invention is the first demonstration of an idea; innovation is the first commercial application of an invention in the market; and diffusion is the spread of the technology or process throughout the

market." This theory was later popularised by other economists such as Lundvall,[40] Nelson,[41] Porter[42] and Ruttan.[43]

The expansion of this technological innovation has been acknowledged as the one and only most important contributing factor to long-term productivity and economic growth. Consequently, the innovation process and the identification of actions required to effect technological change continue to be of paramount interest to businesses, governments and academics. Moreover, innovation is always regarded as fundamental to deal with the pitfalls that come with productivity and economic growth. Hence, inducing the innovation trend towards a more sustainable direction is therefore very crucial on developmental agenda.

Innovation is an all-encompassing term. It is sometimes distinguished from invention and it is that which Schumpeter defined as "the first discovery of new products or processes" but may be alternated with technological change to denote step-by-step procedures followed to get a new product to market. It may even be referred to as "a new product itself, a stage in a product's lifecycle, or to an iterative process of invention and application that links technical, societal and political change". In the same vein, innovation has also been grouped into "incremental, radical or disruptive depending upon

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[40] Lundvall, B.A. *"Innovation as an interactive process: from user-producer interaction to the national system of innovation*", in Dosi *et al*., 1988.

[41] Nelson, R., *National Innovation Systems: A comparative analysis*. *Oxford University Press, New York*, 1993.

[42] Porter, M. S., S., National Innovative Capacity. T*he global competitiveness report 2001-2002 World Economic Forum, Geneva, Switzerland 2001, eds. M. Porter , K. Schwab , J. Sachs, et al, Oxford University Press, New York***,** 102-118, 2002.

[43] Schumpeter, J. A., *The Theory of Economic Development*. *Harvard University Press, Cambridge MA*((1911/1934)).

whether it originates within, or outside, the mainstream, and whether it renders an incumbent technology (or process) obsolete."

It is also crucial to note that innovation theory is not a preserve for any particular discipline. But as Schumpeter opined "conceptual strands are drawn from a variety of academic disciplines and business school analysis of competitive advantage; analysis of national systems; and socio-technical regimes."

Freeman and Perez [44]further taxonomised the innovation process into four categories. The first is "*Incremental innovations* which is said to occur continuously in any industry or service activity. Often, it is as a result of learning-by-doing or learning-by-using, rather than because of specific R&D activity." The second is "*Radical innovations* which also come from outside the current mainstream as a result of R&D activities in enterprises and/or in university and government laboratories, or from smaller firms." These innovations can result in a change in the structure of an entity, but it has lower economic returns and become more localised unless they are joined together to help in the growth of a new service or product in the industry. The third according to Freeman and Perez is the "*Changes of 'technology system' which* are far-reaching changes in technology, caused by technically and economically inter-related innovations that are combined clusters of radical and incremental innovations, together with *organisational* and *managerial* innovations affecting more than one or a few firms." The last is the "*Changes in the 'techno-economic paradigm'('Technological revolutions')* which also goes beyond engineering trajectories for specific process or product technologies, and affect the cost structure and conditions of production and distribution throughout an economic system."

[44] Freeman, C. & Perez, C. (1988) Structural crises of adjustment, in Dosi *et al*. (1988).

However, according to Damanpour and Schneider[45] "innovation adoption is a process that includes two major phases which are initiation and implementation." But Rogers further divided it into "initiation to agenda setting and matching sub-phases. Implementation consists of redefining/restructuring, clarifying, and routinizing sub-phases.[46] According to Rogers, "Implementation focuses on the "post-adoption decision activities" of the process. That is, "when it has been actually put in use in the adopting organization" the part that involves "all of the events, actions, and decisions involved in putting an innovation into use."[47]

Furthermore, Essegbey and Gyamfi[48] conceptualised that "an innovation system comprises of a network of critical actors interacting in a given geographical or sectoral setting to apply knowledge and information producing innovations to address socio-economic problems or needs in context." This knowledge may not necessarily be alien to the situation under consideration. This notwithstanding, modern ways of application and development may be triggered in relation to the people's socio-economic needs and aspirations, which might trigger innovations. According to Essegbey and Gyamfi "the outstanding features of any innovation system *are the critical actors, the relationships between the critical actors and the context of innovation. The relationships are invariably defined by the responses to environmental or contextual factors and stimuli and it* is crucial to accept this perspective for analysis of development issues in relation to the cocoa industry as far as Ghana is concerned because cocoa is a pillar in national

[45] Damanpour, Fariborz, and Marguerite Schneider., Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *Journal of Public Administration Research and Theory* 19:495–522, 2008.
[46] Rogers, Everett M. *Diffusion of innovations*. New York: The Free Press Rosenbloom, 1983.
[47] Ibid
[48] Owusu Essegbey, G and Ofori–Gyamfi, E: *Ghana Cocoa Industry. Analysis from the Innovation System Perspective*, 283, 2008.

development planning." In every innovation system, there are the "critical actors" and the "influencing factors" from environmental interactions and their effect on the cocoa industry.

In the adoption of the "innovation system" to the cocoa industry, it presented an analytical basis for analysing the developments, and innovations in the industry. The critical actors as here include the public institution COCOBOD, the cocoa farmers, the processing companies and CRIG. The discussion of the developments and innovations starts from analysis of the roles and functions of the "critical actors", their relationship with each other and the ups and downs of their interactions which are crucial for achieving the overall goals and objectives of the sector. The actual roles and functions articulating how the critical actors and their roles impact on the cocoa industry are analysed in Table 1.

Table 1. The innovation system in the cocoa industry.

The Critical actors	Main roles and functions
Ministry of Finance and Economic Planning	Oversees Ghana's economic policies and programmes, national budget and resource allocation
Ghana Cocoa Board (COCOBOD) and subsidiaries	Implements government policies and programmes on cocoa and selected cash crops
License Buying Companies	Internal marketing of cocoa purchasing cocoa directly from the farmers and selling to statutory body
Cocoa processing companies	Responsible for processing of cocoa
Cocoa farmers	On-farm production and pre-harvest/industrial processing of cocoa
International buyers/ global companies	Creating demand for cocoa
CRIG and other research NGOs	Conducts research and development on the cocoa tree and farming systems for innovations Promoting rights and corporate responsibilities

The discussions of the impact of the critical actors on the cocoa industry are qualitative in nature. But, the analysis involves a reflection of the main criteria of the roles and functions performed the efficiency in their output which is reflected in the successes chopped vis-a-vis the goals and objectives of the institutions which have affected national development. Contained in the discussion is a measure of the ups and downs in association with significant actors in the system. An analysis of the innovation system

theory, points to the institution that is required to be strengthened to guarantee a maximum innovation. It is instructive to note that CRIG was established in 1938 as the West African Cocoa Research Institute (WACRI). It was originally set-up to research and find solutions to pests and diseases rampaging cocoa farms and affecting production in British West Africa. WACRI became fragmented when Ghana and other British West African colonies became independent states and capable of having their own research stations to tackle cocoa production in a more scientific manner. Afterwards, the scope of work of the institute has been widened to cover research into crops such as oil seed bearing trees like sheabutter, cashew and coffee. Even though they are cultivated in smaller quantities, they can contribute to the country's foreign exchange earnings and provide livelihood support for a section of the population engaged in its cultivation.

CRIG leads in the provision of science and technology inputs for the cocoa industry while other NGO's and state institutions like Institute for Statistical and Social Research (ISSER) embark on socio-economic surveys to inform policies in the industry. The Research Monitoring and Evaluation (RM&E) Department of COCOBOD also conducts periodic research and development of programmes and policies to enable it achieve the set objectives.

It is also instructive to note that in Ghana, some of the notable crop innovations have occurred in cocoa production. These innovations include hybrid cocoa (called Series 2), which was developed to replenish cocoa output. Hybrid cocoa has a lot of advantages than the old cocoa species, namely, *Amazons* and *Amelonado*. For instance, "it gives more pods per tree; has more than two harvest seasons and has a shorter gestation period of three years as opposed to at least five years for older cocoa varieties." Irrespective of

the advantages that come with hybrid cocoa, the most peasants became reluctant in using it. According to Nyanteng,[49] "only 10 percent of cocoa grown in Ghana was of the hybrid varieties."

Various reason(s) have been advanced to explain the above statistics such as "adoption of hybrid cocoa involves a higher cost of production. Again, the variations in the status of peasant farmers which make it difficult for them to acquire resources from friends and family and the cocoa institutions as well as their tendency for bearing risk. From table 1, peasant farmers "are assumed to be making adoption decisions based on the objective of utility maximization. Their main arguments in the utility function are profit and social reward." Peasant farmers are faced with two different choices of technologies, i.e., "hybrid cocoa" and old cocoa species. They are assumed to adopt the technology that offers the higher utility.

According to Essegbey and Gyamfi, "the classical production factors that influence the adoption of hybrid crops are income (including savings and bank loan), land and labour-hired and family labour."[50] Income is required to procure inputs to cultivate hybrid cocoa. Essegbey and Gyamfi[51] emphasized that it is worthy to note that in subsistence farming in Ghana, savings and income are low so bank loan is the most important source of farm finance." Land provides the space for new planting and also makes the use of fixed inputs associated with hybrid crops more profitable. Labour is needed to assist in land preparation, planting of seeds, spraying, pruning, and harvesting of crops.

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[49] Nyanteng, V. K., *"The Prospect of the Ghanaian Cocoa Industry in the 21st Century*." Paper presented at the International Conference on Cocoa Economy, Bali, Indonesia, 1993. October 19–22.
[50] Owusu Essegbey, G and Ofori –Gyamfi, E: *Ghana Cocoa Industry. Analysis from the Innovation System Perspective* (2008), 283.
[51] Ibid., 283.

Organization of the Chapters

The project was organized in five chapters. The first chapter looked at the background to the study. Chapter two involves the study of the *situation problematique* of the cocoa industry before 1938. The third chapter discusses the role of the Cocoa Research Institute of Ghana (CRIG) since its establishment. Chapter four investigates the social and economic impact of the (CRIG) on the people of Ghana in general. The fifth chapter focuses on the research findings and conclusion.

CHAPTER TWO

THE STATE OF RESEARCH IN THE COCOA INDUSTRY BEFORE 1938

Introduction

Accounts of the events in the cocoa industry in the Gold Coast now cannot be found in a unified document. They have been spread across volumes of scholarly journals, articles, thesis and archival documents with their diverse research and academic orientation. It would therefore be a yeoman's job to come by a document that tries as much as possible to narrate vividly the happenings in the cocoa industry in the Gold Coast before the period under consideration. The Historical Anthropologist studied how kin relationship influenced labour hired to till and cultivate cocoa farms while the historical economist has also devoted his analysis of cocoa industry to how the activity determined the capitalist nature of the Ghanaian society. The Economic Geographer might also study the spatial relationship that determined the economic fibre of the society.[52] Though, these scholarly discourses are not geared towards any bias, the different scholars attempted to fill an academic gap relevant for their area of study.

In this section, an attempt has been made to historicize events in the cocoa industry before 1938. This is what the thesis has conceptualised as the *situation problematique*[53] before the institutionalisation and centralisation of research in the industry have been

[52] P. Hill, *The Migrant Cocoa Farmers of Southern Ghana. A Study in Rural Capitalism*. Cambridge, UK: University Press, 1963. See also Gareth Austin *Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press, 2005. R. H. Green and S. H. Hymer, 'Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 (1966).

[53] A French word coined to describe the state of the cocoa industry before the advent of institutionalisation and centralisation in the industry.

crucially analysed to arrive at a new perspective on the subject under study. This has also been addressed by taking into cognizance different perspective from authoritative sources as well.

Olisa Moujama[54] writing on the beginnings of cocoa culture in Nigeria and the world at large opines that "Cocoa was part of the Columbian Exchange, the transfer of various foodstuffs between the Old and the New Worlds arising from Christopher Columbus's voyages. As much as cocoa originated in Central America over 5000 years ago, its popularity and production has spread globally."

The story of cocoa began as a fermented alcoholic drink which was discovered in the Ulua Valley of present-day Honduras, dates somewhere between 1400 B.C. and 1100 B.C. In two millennia, the rest of the world remained oblivious of the existence of cocoa until 1502, when Christopher Columbus obtained the beans in his fourth voyage to the New World. The custom of drinking chocolate soon spread from Spain to other countries. It was in 1657 in London that the first chocolate house was opened in England. The first cocoa drink also spread to countries like France, Holland, and Germany. This later on led to an increase demand from Europe for cocoa beans which later brought about the cultivation of cocoa in suitable areas in Spanish colonies in the New World.

Cocoa planting in Ghana and Nigeria were concentrated on the southern part (south-east and south-west) of the countries; the planting expanded in the 1880s and was concentrated in the hands of the locals. The Governor of Gold Coast, John Rodger, wrote in 1907: *"From its cradle in Akuapem, it has overrun the forest belt of the Eastern*

[54] Muojama O. *The Nigerian Cocoa Industry and the International Economy in the 1930s: A World-Systems Approach*. Cambridge Scholars Publishing: Newcastle upon Tyne, 2018.

Province, and has made rapid strides in Western Akim and other parts of the Central Province, as i shown by the growing exports from Winneba and Saltpond. With the establishment of the botanical station at Tarkwa in 1903, cocoa has been introduced in the Western Province with some successes."[55] Conversely, trading in cocoanomics as coined by Olisa Moujama[56] in the world market was not given much attention until the mid-nineteenth century by factors necessitated by the increased chocolate production and milk in Switzerland in 1876. In that respect, firms such as Cadbury-Schweppes, Fry and Rowntree (Britain) and Nestle and Peters (Switzerland) needed supplies of cocoa beans.

It is instructive to note that the boom in the demand for cocoa bean led to the increased spread of the cultivation of it in suitable areas in the Spanish Colonies in the New World in 1822. Therefore, seeds were bought from Bahia to the island of Sao Tome on the west coast of Africa, after which they did well. Olisa Moujama[57] gives the timeline for the introduction of cocoa in West Africa as follows: "in 1840, cocoa reached Fernando Po by William Pratt. Then it reached parts of West Africa such as Nigeria -1874, Gold Coast in 1879, 1892 in Cameroun and in La Côte d'Ivoire - 1905."

Hitherto, it is instructive also to note that the Gold Coast was a predominantly oil palm producing country after the abolition of the slave trade as enunciated by F.M. Hodgson[58] that "the Gold Coast's principal commercial product was the oil palm.

[55] John Rodger - Governor of Gold Coast, 1907
[56] Ibid.
[57] Ibid.
[58] Ghanaian Public Records and Archives Administration Department (GH/PRAAD) hereafter referred to as in bracket. Administrative Report (ADM.) 5/1/1 *Gold Coast Report of the Blue Book for 1892* by F.M Hodgson, Colonial Secretary, 29

However, the plummeted prices in the world palm oil in Britain from 40-50 pounds to 32 pounds per ton due to new competition from the new supplies of mineral and gas brought about many reverberating effects.

The peasant Gold Coast farmers' adoption of the this golden crop and its subsequent cultivation which promoted the migration of zealous Akuapem and Krobo settler farmers, ensured the spread of the golden cocoa crop in the eastern and central provinces.[59] The resultant trading in the crop was accompanied by *situation problematique* on the ground which called for intervention by the then colonial administration. The section that follows has therefore been devoted to the historical analysis of the *situation problematique* in the cocoa production before the institutionalisation of research and development in the cocoa industry.

Accordingly, like Olisa Muojama alluded; there have been volumes of scholarly digest on the impressive performance of pre-Ghana and Ghana's cocoa industry. However, these studies have palpably failed to attempt a study of the conditions that accounted for the establishment of a central research station to cater for research into cocoa and its allied cash crops in the Gold Coast.

To add up to the analogy, the botany and agronomy of cocoa have been treated by Jan Van Hull[60], D. H. Urquhart[61], and G. A. R. Wood[62]. The cultivation and processing of cocoa have also been dealt with by such scholars as W. Johnson and Eileen Chatt[63].

[59] J. Fosu-Ankrah, Cocoa, *Community and the Politics of Belonging in the Aowin Suaman District in the Western Region of Ghana 1962-2008*. MPhil Thesis University of Ghana, Legon, 2015.
[60] C.J.J. Van Hall, *Cocoa* (London: Mcmillan,1914).
[61] D.H. Urquhart, *Cocoa* (London. New York. Toronto: Longmans, Green, 1955).
[62] G.A.R. Wood and R.A. Lass, *Cocoa* (New York: John Wiley and Sons, 1987, 4th edn.)
[63] W. Johnson, *Cocoa: Its Cultivation and Preparation* (London: John Murray, 1912) & Eileen Chatt, *Cocoa Cultivation, Processing Analysis* (New York: Interscience Publishers, 1953)

Cocoa trade on the world market has received attention from V. Wickizer[64], C. Krug[65], H. Weymar[66], and Robin Dand[67]. The nexus between cocoa and chocolate has been explored by Paul Redmayne[68] and Thomas Insull[69].

In the colonial days, the Imperial Institute of Tropical Agriculture in the Trinidad was responsible for research into agriculture and animal production in the British crown colonies. In the same vein, further studies on the Ghanaian cocoa industry have also been carried out in the area of production, revealing that the cocoa industry was a part of the development of rural capitalism and dependency[70]. The works of Polly Hill[71], Gareth Austin, and Roger Southall fall within this category. The influence of socio-economic factors and the impact of the banking system on the cocoa industry, coupled with the sources of finance for the cocoa producers, have received attention. Some aspects of the effects of the dynamics of the global political economy on the cocoa industry, such as the Gold Coast (now Ghana) cocoa hold-up of 1937-38 have also been examined by Josephine Milburn, Rhoda Howard, David Meredith and Gareth Austin.

However, none of these studies have touched on the *raison(s) d' etre* for the institutionalisation of research into the production of the golden crop - cocoa and its allied cash crops. This has resulted in the existence of a colossal gap in the body of knowledge on the reasons for the institutionalization of research into cocoa.

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[64] Wickizer, *Coffee, Tea, Cocoa*
[65] C. Krug. *World Cocoa Survey* (Quarterly-Papafio. Rome, FAO of the United Nations, 1964)
[66] Helmut Weymar, "The Dynamics of the World Cocoa Market," *The dynamics of the world cocoa market.* (1968)
[67] Robin Dand, *The International Cocoa Trade* Vol. 1. (New York: John Wiley & Sons, 1997)
[68] Paul Redmayne and Thomas Insull. *Cocoa and Chocolate* (London: Oxford University Press, 1948)
[69] Ibid.
[70] PRAAD: Administrative Report (ADM.) 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*
[71] Austin, *Labour, Land and Capital.*

The *Situation Problematique* before the establishment of CRIG

Research into food crop production dates back in the days of old. The *raisons d'être* behind such moves in the historical past have been documented in scholarly works across the academic divide. In the same vein, cocoa which was produced before and after the independence of Ghana and hailed as Ghana's golden crop has been given its fair treatment of the research. This led to the subsequent establishment of the experimental stations, the central research station and now a Cocoa Research Station. This section of the thesis is therefore devoted to an analysis of the *situation problematique* that motivated the establishment of the Cocoa research Station at Tafo. What this thesis conceptualises as the *situation problematique* have been broadly put into two-fold as:

The Sanitation and Cultural Issues[72]

- *Shifting cultivation destroying forest lands.*
- *Poor Planting Methods resulting in low yield*
- *Rejuvenation of old cocoa farms.*
- *Pruning Methods*
- *Control Measures against pests and diseases among others*

[72] The Sanitation and cultural issues have to do with issues pertaining to the general cultural practices adopted in the cultivation of cocoa farmstead. The sanitation issues deals with appropriate nursery practices, planting and spacing, shading and pruning of young cocoa seedlings among others.

Economic factors:

The scattered nature of the experimental stations at places such as Asuansi, Aburi, Kpeve, Kumasi and Tamale as their respective heads was not economically viable in terms of personnel and logistics[73].

The Sanitation and Cultural Issues

Shifting Cultivation

Shifting Cultivation which was gradually affecting thick forest cover which warranted research because as Stockdale indicated *"Little investigational work on this problem - Shifting cultivation has so far been undertaken in the Gold Coast, the position there warrants the commencement of a definite policy of research.*[74]

Stockdale recounted that "In the establishment of a cocoa farm, an area of high forest is felled and burnt. This is then planted with food crops such as maize, cocoyam, plantains, bananas and cassava and amongst these food crops cocoa is inter-planted at stake[75]. Occasionally, a few large forest trees are left to provide a certain amount of shade for the cocoa trees but in parts where extensive stretches of forest have been clearly felled, an area established in a sheet of cocoa without any overhead shade at all can be seen to an extent that the effect will become wind-damaged crops especially during the harmattan season. There were in fact many farms exposed under such situations and they suffered from the desiccated wind of the harmattan, sometimes the result was unthrifty farms on unsuitable land or in badly drained places.

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[73] Ghanaian Public Records and Archives Administration Department (GH/PRAAD) hereafter referred to as in bracket. Administrative Report (ADM.) 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*
[74] Ibid.
[75] Ibid.

The above observation Gareth Austin[76] also supported in his scholarly work *Land, Labour and Capital in Ghana* that "Farmers' practices were generally very different. Asante cultivators, like many of their counterparts further south, tended to establish a series of cocoa farms at increasing distances from their home village. They planted the trees very close together[77]. Though pruning and other sanitation measures were not unknown on their farms, they were much more infrequent than the Department recommended. How often they went round their trees harvesting whichever pods had ripened varied with the price they could obtain for the product. When faced with falling yields, whether because of soil degradation or because of infection or infestation, they tended to replant elsewhere rather than to put more labour and capital into trying to restore yields on existing farms. Let us elaborate on this propensity to move and plant again."

Poor planting methods

In the establishment of a cocoa farm, an area of high forest is felled and burnt; the land would be inter-planted with such crops such as maize, cocoyam, plantains, bananas and cassava among others.

Over the decades, parts of the Department of Agriculture's advice proved to be wrong in its own terms. The practice of spacing widely was no longer regarded as favourable to high yields per hectare, chiefly from the Amelonado variety of cocoa which Tetteh Quarshie brought from Fernando Po was predominantly used by peasant cocoa farmers before 1950. The intensive approach to farm hygiene failed on the European plantations

[76] Ibid.
[77] Ibid.

and by the early 1930's its rationale was undermined by the findings of research conducted in Ghana and Nigeria by the colonial department of agricultural themselves. Already, in 1916 Governor Clifford had observed that despite the recommendations of their department, agricultural officers "very generally admit that recovery usually results' from the weeds-overgrown method of dealing with capsid." For the rest the Department's recommendations were correct if returns on land and quality of produce were the priorities, as it assumed.[78]

But they were inappropriate in terms of the resource endowment, and the relative factor costs, that faced the farmers and to which the farmers' very different choice of techniques appears to have been a response. With fresh land available it made sense to use it when the yields on an existing farm fell, whether because of fertility or hygiene problems. The 'weeds overgrown' policy saved labour and, to some extent, capital. Close planting fitted a general pattern of using land where possible rather than labour and capital. This may seem paradoxical, so let us consider close planting in more detail.

It had the disadvantage given that its logic was to save labour (and/or thereby working capital), that weeding young plants was more laborious where they were tightly packed rather than arranged in wide rows. This problem was aggravated by the fact that they tended to be arranged irregularly, having been sown fairly randomly apparently in order to save time in that process. The pay-off came later. Narrow spacing meant the early formation of a shade canopy, thus removing the need to weed thereafter.

Further, in terms of yield, close spacing is particularly superior to wide spacing in the early years of bearing. This early return on investment of labour and capital would be

[78] Gareth Austin *(2005) Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press.

particularly valuable in an economy in which these were the scarce factors. Again, dense planting appears to have been well adapted to the specific ecology of the Ghanaian forest zone.

In 1943, a specialist report observed: 'One hears criticisms sometimes of the closeness of the planting but this seems to be rather an appreciation of the low fertility of the soil, the closer planting being generally more apparent on the poorer classes of soil'. Farmers' performance over the colonial period demonstrates clearly that their methods produced better economic results than those advocated by the Department and practised by the European planters. At a macro level, Ghana's success in rapidly achieving, increasing and sustaining the position of the world's largest producer of cocoa suggests that the farmers cannot have been far wrong. At a micro level, the commercial failure of the British planters in competition with African farmers in Asante and elsewhere in Ghana is precisely attributable to the planters' use of intensive techniques inappropriate to the prevailing set of relative scarcities. Thus one may conclude that the farmers' initial approach, based on their knowledge and prior experience of the economic and physical environment, turned out to be close to optimal for the adoption of cocoa.

According to Gareth Austin[79], the behaviour of Asante farmers show that they did not simply or dogmatically follow a preconceived set of practices, in which case their success could be regarded as a fortunate gamble. Though close spacing of trees became their standard practice, some farmers had experimented with wider spacing. It is further recounted that, in Amoafo in Amansie which are in the present day Ashanti region, the first cocoa trees were deliberately spaced at wide intervals because planting materials

[79] R. H. Green and S. H. Hymer, 'Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 (1966).

were initially scarce. Later, government agricultural instructors reported some success in persuading farmers to space more widely (for example, at 15 foot [4.57 metre] intervals 'instead of the present system of planting about' 8 feet [2.44 metres] apart). Such reports came from Kumasi district in 1908 and Asante-Akyem in 1912. Besides this willingness to experiment with tree spacing, farmers demonstrated a pattern of pragmatic optimizing in the case of preparation of beans for market: they were willing to put in the labour and capital required to ferment beans well, but only when the cocoa-buyers gave higher prices for better quality beans.

Gareth Austin [80]further accounts that, government administrators tended to be relatively open-minded. The statement from Governor Clifford quoted above was in the context of rejecting a proposal from government agriculturalists that the cultivators who did not follow the Department's prescription for farm hygiene should be fined. Again, whereas the Department of Agriculture fretted that Ghanaian cocoa was the 'vin ordinaire' of the world cocoa market, an administrator observed: 'There has been a very strong demand hitherto for the local quality. There is room in the wine industry both for *vin ordinaire* and vintage claret. There seems to be room in the cocoa industry for different qualities of cocoa'. In 1936, however, the Ashanti Confederacy Council of Chiefs gave chiefs' courts power to fine or imprison farmers who presented for sale 'any cocoa which is not thoroughly dry.' Meanwhile, the planters and the agriculture department stuck firmly to the intensive approach. Being occupationally focussed on agriculture, they may have found it particularly hard to compromise their sense that this approach embodied what they thought of as the characteristically European virtues of discipline, tidiness and

[80] R. H. Green and S. H. Hymer, 'Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26, 1966.

energy. The rigidity of this attitude proved fatal for the profitability of the European plantations in Asante and elsewhere in Ghana. The government agriculturalists could maintain the same outlook for longer because they did not have to make money to survive. The department appeared content to run a model plantation on the same intensive lines at what, commercially, would have been a fatal loss. Research findings from colleagues gradually undermined some of its specific initial recommendations. But the general direction of government research on techniques of cocoa cultivation was to find more effective ways of being intensive in West African conditions: to be right next time, as it were.

This scientific effort was stepped up after the emergence of a new and extremely serious threat to the health of cocoa farms. A new cocoa disease, to be known as swollen shoot, appeared in the Eastern Province of the Gold Coast Colony in the 1930's.

In 1940 the government botanist, A. F. Posnette[81], identified its cause as a virus. There seemed to be no practical alternative to the removal of all trees that might possibly have the pathogen. This 'cutting down' policy was particularly unwelcome to farmers because the trees to be destroyed included those which, though diseased, were still bearing pods; plus other trees which as yet showed no sign of infection. Yet the controversy about how to treat it was significant for farmers in Asante as well as elsewhere in that, for the first time, government agricultural science made a major contribution to best-practice in cocoa farming in Ghana. It was, moreover, a discovery that went against the grain of farmers' preconceptions. Having described the rationale for the 'weeds overgrown' method (in the

[81] Gareth Austin . *Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press. *2005.*

passage quoted earlier), Kojo Dukwoh[82] went on to claim that the method would work for swollen shoot too, which he identified with *akate*, the farmers' name for capsid infestation. But this time the farmers did not know best.

From 1944 government scientists, based at the new Cocoa Research Institute at Tafo in the Eastern Province of the Gold Coast Colony, proceeded with a range of trials designed to offset the damage which swollen shoot was doing to Ghana's cocoa supply capacity. Breeding experiments eventually resulted in a succession of earlier-maturing, higher yielding varieties of cocoa.[83] In 1956 the Ministry of Agriculture made chemical pesticides available to some indigenous cocoa-farmers for the first time at prices that made them seem worth using. Fertilizers were to follow. This combination of innovations, taken as a package, raised the possibility of a fundamentally new production function for cocoa in West Africa.

Compared to the production function within which farmers were used to working, the share of capital and (net) labour in total factor inputs would be higher and that of land, lower. For the present analysis three cautionary observations should be made. The first is that, simply, the new inputs only began to be available at the very end of our period and their initial impact (including on the proportions in which farmers combined factors) was so modest that they can largely be ignored when we seek to explain the property rights regime in factors of production, and the related markets, as they existed to the end of the period. Amelonado continued to account for the overwhelming majority of new plantings through the 1950s, presumably because most farmers could obtain it at no cash cost from

[82] Gareth Austin . *Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press. *2005.*

[83] PRO CO96/768, '*Cocoa - (Cacao) Diseases.* In: A. F. Posnette, 'Transmission of "Swollen Shoot" disease of cacao', 16 Feb. 1940.

their own or their close relatives' existing farms. The 1956 -57 crop year was the very year of the household survey which was the first time in which chemical pesticides were used on a significant scale. Even so it was a fraction of the level at which they were to be used over the following several years. They may have added between one and two per cent to the total 1956 -57 crop, though it may well have been less. On the other hand, the new inputs are relevant to assessments of possible subsequent trends.

Secondly, the economic and ecological superiority of the new inputs and techniques over the established ones remained very questionable. Even after 1956-57. D. Leston's[84] examination of the evidence concluded that while routine insecticide use had raised yields in the short term - though not in all the Asante field trials - the longer-term benefits were doubtful, especially because the insecticides killed the ants who were the capsids' natural predators. Meanwhile fertilizers could raise yields, but research in south-western Nigeria concluded that their use was profitable only if producer prices were relatively high.

Finally, how useful was it to raise yields per unit area while land remained relatively abundant? Insecticide and fertilizer use seemed to be profitable for farmers only when the producer price was relatively high and/or when the inputs were subsidized. In short, the technical advances of the 1950's may be seen as significant primarily as a step towards a more intensive approach to cultivation that would (perhaps after further technical progress) eventually become appropriate - in the sense of optimal under the prevailing set of scarcities - as land became scarce in the forest zone.

[84] PRO CO964/17, Kojo Dukwoh to Secretary of [Watson] Commission, Kumasi 19 April 1948.

Poor shades

It is on record that the Aburi Botanical gardens started experimenting with cocoa around 1890 but was failing. The superintendent of the garden attributed this to the unsuitable climate at the time. However, upon a visit by Sir Hesketh Bell, who was an officer with a West Indian experience, to the Gardens in that same year he pointed out that "the cocoa had been planted on an exposed hillside with no shade." But this failure turned out to be more shocking because the Basel missionaries had earlier on grown cocoa trees in the Gold Coast for over four decades, and at least 100's of acres of cocoa have also been cultivated by African farmers, some of which were within a radius of five miles from Aburi Gardens.

As noted by Klein et al[85] "studies on cocoa pollinators have centred on breeding substrates rather than the role of landscape matrices. The use of slices of banana stems was found to be a good breeding substrate for midges. This increases their population and pods of cocoa farms but its practical application is however yet to be developed. Mostly, newly established cocoa farms in Ghana are intercropped with plantain or banana as temporal shade cover, as staple food, and for income prior to and at initial fruiting stages.[86] The evaluation of the impact of plantain or banana stands on cocoa pollinators helped to develop its mass application. This study therefore assessed two landscape features. The relative contribution of natural forest and proportion of cocoa and plantain/banana intercrop to cocoa pollination, which are familiar components of cocoa cropping practices in Ghana.

[85] Gareth Austin *(2005) Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press
[86] Leston, '*Diseconomy of insecticides in cocoa production in Ghana'*.

Cocoa fermentation issues

The issue of quality cocoa beans dominated discussions of the colonial department of Agriculture Department. The department held views which were different from the peasant cocoa farmers and the cocoa merchants. The Department of Agriculture preferred that farmers use better fermentation methods and to cautiously remove bad beans to help to boost the quality and purity of cocoa for export. The department moreover wanted the merchants to help them bring this arrangement into force by paying for higher premiums for higher quality cocoa beans. The rationale was to provide an economic incentive to the farmer for strictly abiding by the best practice. Since neither was willing, the Department sought to achieve this by enacting ordinances to enforce its point of view.

In fact, the concern over quality can be referred from the very first report of the Botanical and Agricultural Department in 1906, but could not advance proofs to substantiate claims made. A temporal measure was instituted for picking over cocoa in order to separate it into "first" and "residue" grades fell through when it was found that the first grade would fetch only 15 shillings per ton more than the unpicked, and the loss on the residue grade would substantially exceed this gain (quite apart from costs to farmers of separation and the costs to firms of inspection). However, in 1907 a trial shipment by the Department of Agriculture's specially fermented and picked cocoa failed to "prove" that premiums for higher quality were economically sound. Though the department of Agriculture propagandised that there was a difference in price between Gold Coast cocoa and first grade, it turned to be that there was utter confusion between the intrinsically different cocoas. The reason had been that though the West Indian criollo is a fine quality cocoa, it is utilized in limited quantities for flavouring in basics. The Amelonado type were grown

in Ghana. This necessitated the genuine need for improved methods of drying and fermentation, but the Department's constructive role in this area was very limited. Since neither was willing to comply completely, the Department sought and to some extent achieved ordinances to enforce its point of view.

However, the gradual solution through improved use of the African open pile technique was agreed to be satisfactory if properly carried on extensive scale by sharing the experience among the farmers.

Governor Clifford's answer on the appropriate role of government is also interesting: "*To prevent owners of produce from offering for sale, and merchants from buying cocoa which it pays one to sell and the other to buy is an arbitrary interference with trade and with private rights and discretion which could only conceivably be justified if the course pursued were proved to be doing some vital injury to the industry as a whole and to the colony as a cocoa-producer."* However, the concern over quality cocoa beans has continued right to the present. However, from 1928 to 1938 extensive efforts were made to develop cooperatives selling quality cocoa beans. Indeed, it was the major activity of the Department. The narrative on the quality cocoa beans were also essential in the sense that some Gold Coast cocoa producers were into the practice of fermenting their cocoa in a hole dug few metres beneath the ground on their farmstead. This was a practice that did not augur well with the then colonial department of agriculture as it adversely affected fermentation. In addition to the fermentation issues, there were also reports of fire being used to dry cocoa beans especially in the very wet season in the colony. This resulted in the production of what is described as "smoky" or "hammy" cocoa beans. At the beginning of the main crop season, there is often a rush on the part of farmers to produce

cocoa for early disposal, in order that cash may be secured for their most pressing needs. Pods are often reaped before they are mature, fermentation is hastened and inadequate drying is adopted. This resulted in the production of underfermented and damp cocoa beans being produced. Normally, such cocoa beans are thrown on to buyers at an early date as possible. Some of these cocoa beans even go to the extent of germinating. The practice also resulted in the growth of moulds resulting from improper treatment of cocoa beans in their fermentation heaps and insufficient drying. Germinated beans resulted from the poor fermentation and infrequent reaping and *slated* cocoa were all caused by under fermentation. Other cocoa defects consisted of small or flat beans, beans affected by weevils, beans which are stuck together, adulterations with pieces of shell, broken beans and other foreign matter.

However, in all these, the colonial department of Agriculture at the time continued on a considerable amount of propaganda on the best methods of preparing cocoa different from how the Gold Coast cocoa farmers thought of as the cultural practices. This assertion Hymer and Green also concur that on the issue of quality, the Agriculture Department of the Gold Coast colonial government held views opposed both to those of the farmers and those of the merchants.[87]

The presence of the Blackpod disease

Blackpod disease was fairly common in some farms, but it was recognized that this disease could not be kept in check to some degree by regular picking. Pods damaged by

[87] Hymer and Green, Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 (1966)

squirrels and rats were also common cases and were not been collected.[88] Thrips which would described as any of an order *(Thysanoptera)* of small to minute sucking insects many of them feed often destructively on plant juices also appeared to be common on pods in farms in such exposed situations but very little leaf damage from thrips were being damaged.

On the question of disease control, the Department deplored the African practice of allowing diseased farms to lie fallow instead of taking more active rehabilitative measures. A narrative in a 1913 report on the situation concurs that and further supported that the system is wasteful in the extreme. However, in its submission, the Department admitted that the "*fallowing* method of disease control almost invariably leads to complete recovery, which would seem an excellent justification." The Department also believed that "infested areas provided sources for spread of harmful insects and viruses but in any event, the diseases, with the two exceptions of capsid and swollen shoot, proved minor and in no case did the Agriculture Department discover a cure. Hence, the swollen shoot and capsid were serious threats beginning in the mid-1920's. But they were not intensively studied until after the founding of the West African Cocoa Research Institute (WACRI) in 1937 and not controlled until the 1950s.[89] When an expert evaluation of productivity was made in 1936-37, the author, C. Y. Shephard in a document titled *The cocoa industry in Trinidad asserts that: "The brief description of methods of cocoa cultivation in the Gold Coast shows that the farmer has adopted few of those expensive operations which planters in Trinidad and Grenada consider necessary*

[88] Klein, Martin A., *Slavery and Colonial Rule in French West Africa* (Cambridge, 1998).
[89] Hymer and Green, Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 (1966)

for the maintenance of yields and profits . . .but it is a fairly safe assumption that the yield in the Gold Coast is at least twice that obtained in Trinidad and equivalent to that obtained by intensive methods in Grenada."[90]

Again, W. H. Beckett, in his comments, cites "*sankonuabe* (in the Akan dialect *as "go back to oil palms" or go back to the harvest oil palms*) as having been controlled by Department action." The Department reports suggested that "the attacks were first overestimated and then receded. In fact, these were largely early capsid outbreaks. The level of loss remained high, although never adequately estimated, until control was developed and instituted-in the 1950s and 1960s, not in the 1920s or 1930s." For instance, Hammonds scholarly work on, *Cocoa Agronomy*, estimated loss of farms resulting from seedlings been killed from capsid as perhaps 50 per cent prior to control in the late 1950s was an excellent reason for scattering new farms.[91]

The best summary of the "Agricultural Department's contribution to cocoa technology prior to the establishment of WACRI remains vague and that explains why an expert committee report stated that until 1937 there was no single agricultural station in the cocoa belt where research could be carried out on the requirements of the crop." [92]It was difficult to see how any officer of the Department could be expected to offer correct advice on cultural or other treatment, as he had no opportunity to acquire knowledge under local conditions. In addition, pruning received practically no attention and it was only during the earlier years of growth that the lower branches of the young cocoa plants

[90] C. Y. Shephard
[91] PRAAD: Administrative Report (ADM.) 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*
[92] R. H. Green and S. H. Hymer, 'Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26 , 1966.

are removed especially in their later years of the cocoa plants to give them abundant sunshine which affected yield per hectare.[93]

The training centres and the Rejuvenation of Cocoa farms

There was the need to embark on the rejuvenation of the old cocoa planting which had led to the lower or declining yields from the old cocoa planting. The presence of these very cocoa plants which needed replanting as they were more than 20 years and thus experiencing declining yields.[94]

Frank Stockdale on his working visit to the Gold Coast recommended that there should be a massive training of the people in Agricultural education in the Gold Coast and other West African dependencies.[95] On that account, there was the need for a higher training for subordinate Agriculture and research officers in Nigeria to serve in their respective departments. The Gold Coast, though at the time had through scholarship sent selected individuals to California and the Imperial College of Tropical Agriculture in Trinidad for training by then, because it was observed that though Achimota too had started training programmes in Agriculture, its location would not make training in agriculture very sufficiently practical in character to be of the fullest value to the country Gold Coast.

There was therefore a proposal for the establishment of a *practical training and for an experimental settlement scheme in cocoa-growing areas.*[96]

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[93] Ibid
[94] Ibid
[95] PRAAD: ADM 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*
[96] PRAAD: ADM 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*

The economic prosperity of the Gold Coast depended solely on the export of cocoa. However, there were problems with the quality of the cocoa produced in the Gold Coast which accounted for the emergence of series of proposals aimed at ensuring improved cocoa quality of the Gold Coast produce.

Like the other cocoa research stations established under the British imperial colonies especially in Nigeria; work into research had already begun in experimental plantations of certain selected high-yielding stations. It is in this light that Frank Stockdale in a working visit to the West African colonies mooted that: *In my view, the Gold Coast Government should take immediate steps to establish a special experiment station where research work for its cocoa industry can be carried on.*[97]

The extensive nature of the industry in terms of acreage was impressive but evidence of its declining output or yields previously cultivated in some areas were on the decline.

The above assertion necessitated that high-yielding strains be made available to peasant farmers in order to rejuvenate their farms, old plantings and expand their plantations' acreage as well.

Varied reasons and explanations abound on how the rejuvenation of the industry must be ventured into.

Firstly, the methods for the rejuvenation and treatment of existing farms have to be worked-out in detail and demonstrated to the peasant cocoa farmers. This is because it was believed that if that was not done, the prestige accorded the Gold Coast cocoa would

[97] PRAAD: ADM 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*

or could not be maintained among trading partners which might lead to an ultimate or inevitable decline of the industry.[98]

To the Gold Coast Cocoa administrators, it was suggested that, with immediate effect, implement the suggestions and inspirations drawn for the Cocoa Research Scheme that started from the Imperial College of Tropical Agriculture in Trinidad by establishing a research station for Cocoa.

According to Frank Stockdale: *it has been realized that it is only from research that guidance and assistance can be obtained*[99] but the Gold Coast which had the largest cocoa in the British Empire was still contended with the present and is taking no steps to safeguard the future.[100] Secondly, there was the need to have a platform/institute for educating farmers on the best practices or cocoa culture.

The moot for centralisation of research into cocoa.

The *situation problematique* before the establishment of a central research station were as follows:

- The need to increase yield of local farms by the approved methods of manuring, cultivation and Sanitation were very important of the problems to be tackled in the industry
- Very little local knowledge of the best farm practices methods.

[98] Ibid.
[99] PRAAD: ADM 5/3/30 *Gold Coast Report by Mr. Frank Stockdale, CMG, CBE. Agricultural Advisor to the Secretary of state for the Colonies; October 1935 to February 1936.*
[100] Ibid.

- Unsuitability of the existing experiment stations and gardens for any special work on cocoa. Reasons abound to elucidate the assertion on the unsuitability of these stations. Notably, the Tamale, Asuansi and Kpeve Experimental Stations were considered to be completely outside the predominant cocoa belt in the colony. The station and garden were considered not to be climatically representative enough to support large scale plantation of cocoa and an extensive research. In the case of Kumasi, it was reported by the Colonial Department of Agriculture that it had not gotten enough land to embark on such a purpose.

The Colonial department of Agriculture upon the recommendations and suggestions of the Imperial College of Tropical Agriculture in the Trinidad and Frank Stockdale proposed for the establishment of a station in either the eastern or western provinces of the colony as suitable for the establishment a station which is centralised. The mandate was to deal with the problems affecting the welfare of cocoa farms and moreover the provinces are also climatically good for growing cocoa especially its annual output of some 130,000 tonnes of cocoa a produce which is about half-a-million acres of farms.

Reasons for the Gap in Centralisation

It is reported that "not until 1905 (in the words of the 1927 Committee on Agricultural Policy and Organization) agricultural policy was limited to the importation of exotic plants and observation of their behaviour under local conditions. Agriculture was confused with decorative horticulture,[101] and no studies of crops, yields, or techniques of

[101] R. H. Green and S. H. Hymer, 'Cocoa in the Gold Coast: a study in the relations between African farmers and agricultural experts', *Journal of Economic History* 26, 1966.

cultivation were attempted." In 1905 the Department of Agriculture was restructured, and subsequently placed emphasis on instruction and demonstration without local research.

The "*Agriculture Policy and Programme Report"* pointed to lack of intensive research work as a very critical issue to tackle. By this, the Department of Agriculture assumed that, "the domain of investigation lay in the laboratory and not in the experiment station and further it noted that agricultural stations were in the hands of junior and partly trained overseers."[102]

In calling for a change from a "*limited Policy of Protection of existing industries to one of resource development"*, the Department of Agriculture warned that "neither the organization nor staff, nor facilities was fully prepared. Therefore, during the crucial years of cocoa expansion, the Department was neither inclined toward, nor capable of, scientific investigation of the best way to grow cocoa." [103]

In 1917-1918 the Agricultural Department's criticism of the farmers resulted into the production of series of sessional papers supporting the Agricultural Department's attempt in the colonial council to pass legislation designed to improve practices. The proposed legislation, it was believed would empower the colonial government to "require certain standards of maintenance for farms and to fine owners who allowed their farms to fall below these standards; to halt further planting if this was deemed necessary; to prohibit the export of bad cocoa; and to forbid the cutting down of palm and other trees to make way for cocoa." The attempt failed, but through the intensity of the Department's protests with their policies went down well into the 1950s. There were four themes that

[102] Ibid, 26
[103] Ibid, 26

predominate these production activities: “production techniques, disease control, the quality of cocoa, and the degree of specialization on the farms.” [104]

According to Frank Stockdale “The chief concern of the Department's views on production techniques centred on a call for intensive cultivation, in such matters as lining and pegging; neat rows and clean weeding; ditching; open, uniformly dry fields; and so forth. They felt that farmers are in a rush to get more and more acres under cocoa were overextending themselves and not taking proper care of their farms which they did by making their farms too large.” [105] To the Department, it seemed clear that the farmers' use of less careful techniques was due to short-sightedness, ignorance, and a single-minded search for "the attainment of the maximum amount of money with a minimum expenditure of energy, however uneconomical the system."[106]

Ironically, the valid warning that extensive clearing might lower moisture content and injure long-run prospects was not applied to the schemes for neat rows, separated trees, and clean weeding all of which tend to increase water loss and erosion.

Summary of the chapter

The chapter has done a narrative of the *situation problematique* before the advent and institutionalisation of research into the cocoa industry in Ghana. This explains the raison(s) d'être for the establishment of the cocoa research institute to address the pressing issues that needed to be done to address the situation. It has revealed that for economic expediency, a research institute had to be centralised to make it economically

[104] Ibid.
[105] Ibid.
[106] Ibid.

viable to operate and to an extent help in addressing problems in the cocoa industry at such central position. In the same vein, the cultural practices in the industry previously also left much to be desired.

CHAPTER THREE

THE ROLE OF THE CRIG IN THE COCOA PRODUCTION IN GHANA

The Ghana Cocoa Industry - An Overview.

Cocoa is a native crop of the Amazon basin in South America.[107] History has it that it was first brought to the then Gold Coast (now Ghana) by the Dutch missionaries in the early years of the nineteenth century.[108] In 1879, Tetteh Quarshie of the Gold Coast, returning from Fernando Po where he had gone to work as a blacksmith brought with him pods of cocoa. Tetteh Quarshie was reported to have started his cocoa farm in Akuapem Mampong in the Eastern Region. Other enthusiastic farmers bought pods from Tetteh Quarshie's farm. Consequently, the spread of cocoa farms in the Eastern Region where the Ghana's rain forest provided the crop with a suitable environment in which it has thrived to date.[109,] Cocoa cultivation subsequently assumed commercial dimensions and spread to all forest areas of the country particularly Eastern, Ashanti, Brong Ahafo, Volta, Central and the Western Regions.[110] The crop is harvested twice in a year, the major season starts from October and the minor season from June.[111]

In 1891, the country produced 0.036 tonnes of cocoa. As the crop continued to enjoy high patronage from farmers, production of the crop rose to 1,018 tonnes in 1900 and then to

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[107] Legg, J.T. and Owusu. G.K. (n.d.) *"Ghana's Cocoa Industry and Swollen Shoot Disease"*, Cocoa Research Institute of Ghana, Tafo, Ghana.
[108] Editorial. "Celebrating 60 Years of Total Support for Nation Building." COCOBOD News Vol. 2 Issue 1 April, 2007. A Publication of the Ghana Cocoa Board. 3
[109] Ibid., 3. See also Legg, J.T. and Owusu. G.K. (n.d.) "Ghana's Cocoa Industry and Swollen Shoot Disease", Cocoa Research Institute of Ghana, Tafo, Ghana
[110] "Our Concern – Social Responsibility." Ghana Cocoa Board, 2009 Executive Diary, 57-58.
[111] Ibid., -58.

316,650 tonnes in 1936.[112] Recognizing the vital contribution of the cocoa crop to the development of its economy, the then Gold Coast government created the Gold Coast Cocoa Marketing Company in 1947. The company was to provide permanent marketing services to the farmers.[113] In 1984, The Ghana Cocoa Board Law (PNDCL 81) was promulgated and it has guided the operations of the COCOBOD till now.

The Role of CRIG

The role of CRIG has been the actions taken to improve upon the cocoa through scientific research which has brought about innovation in the industry. Basically, the thesis conceptualizes these actions as innovations which were introduced into the cocoa industry. These can be seen in narratives that follow.

Characterised swollen shoot as a viral disease

The first swollen shoot outbreak was Cocoa Swollen Shoot Virus is classified as a badnavirus, a virus with serologically unrelated virions. Cocoa Swollen Shoot Virus has undoubtedly contributed directly and also indirectly to the drastic decline in cocoa production that has occurred in West Africa Cocoa Swollen Shoot Virus is of great economic importance in West Africa, with numerous symptomatologically distinct variants and a restricted host range. Experimental host range is limited to about 30 species in the station.

[112] Legg, J.T. and Owusu. G.K. (n.d.) "*Ghana's Cocoa Industry and Swollen Shoot Disease*", Cocoa Research Institute of Ghana, Tafo, Ghana.
[113] Editorial. "Celebrating 60 Years of Total Support for Nation Building." COCOBOD News Vol. 2 Issue 1 April, 2007. A Publication of the Ghana Cocoa Board. 3

Among all the regional diseases of cocoa, Cocoa Swollen Shoot Virus Disease (CSSVD) is probably of greatest importance. [114] It has also been reported that the disease is the most intractable and destructive to strike at the cocoa industry in West Africa[115]. The economic importance is evidenced by the serious decline in Ghana, Togo, Cote d'Ivoire and Nigeria. In Nigeria, large areas have been abandoned due to the devastation by CSSV in areas referred to as 'areas of mass infection.[116]

Biological control by the use of mild train cross protection where cocoa trees were protected using mild strains of the CSSV against more Virulent and related strains has been attempted.[117] This method is risky, because Broadbent[118] has pointed out that a 'mild' strain may damage other crops, and may also mutate into virulent strains. There have been many previous attempts; both chemical[119] and biological[120] at controlling the mealy bug vectors of the virus but these studies were discontinued for various reasons. Recently, studies on the possible use of natural enemies have been revived.[121] Also,

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[114] Pereira, J.L., Prospect for effective control of cocoa diseases. In: Proc. *12th International cocoa research Conference, Salvador, Brazil,* November 17-23,1996, 81-86. (1996)

[115] Thresh, J.M., The ecology of tropical plant viruses. *Plant Pathol.* 40:324-339. (1991).

[116] Adejumo, T.O., "Crop Protection Strategies for Major Diseases of Cocoa, Coffee and Cashew in Nigeria". African Journal of Biotechnology, Vol 4, No.2, February 2005. [accessed 2018 December 21] 143-150.

[117] Ibid 150-152.

[118] Broadbent, L., Control of plant virus disease. *In Plant virology Corbett and Sisler* (Eds) Univ. Fla. Press, Gainsville. p527. (1964).

[119] Mapother, H.R. and Nicol, J. (1953). Mealy bug studies. *Rep. W. Afr. Cocoa Res. Inst.,* 1950-51:40. See also Armstrong, K. B. (1961). Systematic insecticides. *Report of West African Cocoa Research Institute.* 1959-60; Hannah, A. D. and Heattherington, W. (1957). Arrest of the Swollen Shoot Virus disease of cocoa in the Gold Coast by controlling the mealy bug vectors with the systemic insecticide, Dimefox. *Ann. Appl .Biol., 45:* 473-480; Marchart, H. (1963). Uptake of Systemic Insecticides. *Rep. Cocoa Res. Inst.* Ghana, 1967/68:40 and Firempong, S. (1984). Screening of insecticides for mealy bug control *Rep, Cocoa Res. lnst., Ghana,* 1976/77-1978/79: 72.

[120] Anon, Capsid Research: Chemical control. *A1J1I. Rep. W Aft Cocoa Res. Inst.* 1949-50: 40-42, (1951). See also Decker, F. E. (1955). Mealy bug studies; biological control of mealy bugs. *Annual Report West Africa Cocoa Research Institute,* 1953, p23; R.G. Donald, Mealy bug studies: Introduction of exotic parasites. *Annual Report West Africa Cocoa Research Institute,* 1953, 23.

[121] Ackonor. J. B., Preliminary studies on breeding and predation on Symnus *(Pullus)* sp. and *Hypermpis egregia* Mader on *Planococcoides njalensis* Laing: *Proc. 1st Cocoa Pests and Diseases Seminar. Accra. Ghana. 6 10 November.* 1995: 238-241. (1977).

Adenikinju *et aI.,*[122] reported that in CSSV research, there was recovery of virus-free plants from virus infected indexed cocoa in premium elite stocks. Lately, barrier cropping is being used as one of the control methods against the Swollen Shoot Virus disease in Ghana. It must be realized that an obvious and sustainable solution to the CSSV problem would be to intensify the search for cultivars of cocoa with high level of resistance to CSSV infection.

As a result of various breeding efforts, varieties with higher resistance to the virus compared to the standard Amelonado have been developed.[123] Adu-Ampomah also asserts that the breeding for varieties with resistance to the disease appears more promising.[124] In Ghana, the continuous decline in cocoa production has been largely attributed to the incidence of Cocoa Swollen Shoot Disease more than any other disease. Since 1936 several attempts have been made to control the disease. The removal of infected trees and replanting with improved virus tolerance varieties have been the basic method of control for CSSV.[125] However, Thresh *et al.,* and Ollenu *et aI.,*[126] have emphasised that successive campaigns of eradication have failed due to the use of cocoa cultivars with moderate tolerance as planting material after eradication.

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[122] Adenikinju, S.A; Esan. E.B: Adeyimi, A.A. Nursery techniques, propagation and management of cacao, kola, coffee, cashew and tea. l-27. In: *Progress in Tree Crop Research* (2nd Edition), Cocoa Res. Inst. Ngr. Ibadan, (1989).

[123] Thresh, J.M. Owusu, G.K. Boamah, A. and Lockwood, G., Ghanaian COCOB varieties and Swollen Shoot Virus disease. *Crop Protection* 7: 219:231,1988.

[124] Adu-Ampomah, Y., The cocoa breeding program in Ghana: Achievements and prospects for the future. *Cocoa Growers' Bulletin 50: 17-21,* (1996).

[125]Adegbola, M.O.K., Significant developments in the study of the Cocoa Swollen Shoot Virus disease. *Bulletin of Entomological Society of Nigeria* 3: 6 - 18. (1971).

[126] Thresh, J.M. Owusu, G.K. Boamah, A. and Lockwood, G. (1988). Ghanaian COCOBOD varieties and Swollen Shoot Virus disease. *Crop Protection* 7: 219:231. See also Ollennu, L.A.A., Owusu, G.K., Thresh, J.M. (1989). "The Control of Cocoa Swollen Shoot Disease in Ghana." Cocoa Growers' Bulletin No. 42. U.K. 12-21.

The cocoa industry in Ghana has been faced with a number of challenges, from diseases and insects which has the potential to destroy the industry[127] with its adverse consequences for the country's economy. Cocoa diseases in Ghana include cocoa necrosis virus (CNV) genus Nepovirus, [128] cocoa mottle virus, black pod rot[129], cocoa swollen shoot virus (CSSV).[130] Insects that destroy cocoa trees and crops include capsids that damage the plant material by feeding on the sap of cocoa trees and the mealy-bugs that spread the CSSV. Progress has been made in the control of these diseases and insects by the application of chemicals, good agricultural practices, biological means and the eradication of diseased trees.[131]

Though several methods have been used successfully in solving the various problems facing the cocoa industry, the eradication method applied to solving that of the cocoa swollen shoot virus disease met fierce resistance from a number of cocoa farmers.

The Cocoa Swollen Shoot Virus Disease (CSSVD) which is spread by the mealybug, has over the years caused a significant reduction in cocoa production in Ghana. The most effective method of checking the spread of CSSVD is to eradicate diseased cocoa trees and other symptomless trees within and up to a distance of about 15 meters. Compulsory powers have therefore been given to the department of Agriculture since 1946 to cut down all diseased cocoa trees and nearby ones though these may not appear to be visibly

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[127] Ploetz, R.C., "*Cacao Diseases: Important Threats to Chocolate Production Worldwide.*" http://www.worldcocoafoundation.org/info-center/document-research-center/documents/Ploetz2007D.pdf [accessed 2018 December 21] 1634-1639. (2007).
[128] Olunloyo, O.A. (n.d.) "*A General Overview of Cocoa Viruses in West Africa*." Cocoa Research Institute of Nigeria, Ibadan, Nigeria. http://www.iita.org/cms/details/virology/pdf_files/137-157.pdf. [accessed 2018 December 21
[129]ICCO. *Pest and Disease Related Damages to Cocoa Crops.* http://www.internationalcocoaornisation.net/questions/pests.htm [accessed 2018 December 21].
[130] 'Cocoa Pest & Disease Management: Best Known Practices'. Imperial College London. [accessed 2018 December 21].
[131] ICCO. *Pest and Disease Related Damages to Cocoa Crops*. [accessed 2018 December 21].

infected as a means of checking the spread of the disease. Though several approaches have been used in implementing the control of the CSSVD through the destruction of diseased trees over the years, they have all been met with fierce resistance from farmers.

The main cause of this resistance according to the CSSVDCU - COCOBOD report for 2007/2008, include caretaker farmers fearing loss of land if the cocoa trees were cut off. Also, the non-availability of financial support to replant and maintain the treated farms. Most importantly, it recognizes that farmers have resisted attempts at controlling CSSVD because the approaches used in implementing the control programme were not customer-driven.[132]

Though it has been difficult to estimate losses in the production of cocoa due to the CSSVD, Philips put the annual yield losses at about 20,000 tonnes of cocoa.[133] According to Hale annual yield losses of cocoa attributable to the CSSVD was 120,000 tonnes.[134] However, Legg on his part put the estimated annual yield losses between 1946 and 1974 at over £3 650 000.[135] This has been established by Thresh and Owusu,[136] who have provided evidence that cocoa farmers, since the colonial era, have resisted the move to

[132] CSSVDCU-COCOBOD 2007/2008 Report
[133] M.P. Phillips, "Production in the Eastern Region of Ghana." Report and Proceedings of the 1961 London Cocoa Conference, 1992, 178-9.
[134] Hughes, J.D.A. and Ollennu L.A.A., "Mild Strain Protection of Cocoa in Ghana Against Cocoa Swollen Shoot Virus – A Review." Plant Pathology 43. Cocoa Research Institute of Ghana, Tafo, Ghana. 442-457, (1994).
[135] Legg, J.T., "Cocoa Swollen Shoot Disease – Know Your Enemy," Proceedings of the Fifth International Cocoa Research Conference, Ibadan 1975, 397-402, 1977.
[136] Thresh, J.M. and Owusu G.K. "The Control of Cocoa Swollen Shoot Disease in Ghana: An Evaluation of Eradication Procedures." Crop Protection, 5 (1).Butterworth & Co. (Publishers) Ltd. East Malling research Station Maidstone, Kent ME19 6BJ, UK and Cocoa Research Institute of Ghana, Tafo. 41-52. (1986). See also Dade**,** H.A. No. V of, "Swollen Shoot of Cacao, Report on Mr. H.A. Dade's Visit to the Gold Coast." Printed by the Government Printer at the Government Printing Department, Accra. Crown Agents for the Colonies, London. 1937; Ollennu, L.A.A., Owusu, G.K., Thresh, J.M. (1989). "The Control of Cocoa Swollen Shoot Disease in Ghana." Cocoa Growers' Bulletin No. 42. U.K. 12-21.; Legg, J.T. and Owusu. G.K. (n.d.) "Ghana's Cocoa Industry and Swollen Shoot Disease", Cocoa Research Institute of Ghana, Tafo, Ghana.

cut down the diseased trees with some reported cases of open clashes. A report from the Cocoa Swollen Shoot Virus Disease Control Unit (CSSVDCU) of the Ghana Cocoa Board (COCOBOD) also indicates that the Unit was having problems with farmers as they opposed to the eradication method of treating the disease (CSSVDCU-COCOBOD) 2007/2008, unpublished).

Characterised and Isolated CSSVD and developed methods for diagnosis

The first swollen shoot outbreak was reported in 1936 in Ghana. Although there is an unverifiable claim that its first occurrence was in 1922. This feature of it was identified soon after it was introduced into the hinterlands by peasant cocoa farmers. disease may have become established in cocoa soon after the crop was introduced around 1890s.[137] The causal agent is a mealybug-transmitted virus that also infects several indigenous trees of the West African tropical rain forest areas or adjoining savannah.

According to Andoh, "the basic method of controlling vector-borne viruses of tree crops is by eradicating sources of infection and measures have been used extensively and with some success in Ghana since 1944 in an attempt to control, or at least to contain, the spread of swollen shoot disease." Legg also opines that "an ambitious eradication campaign resulted in about "1.99 million hectares of cocoa are grown over approximately 7"35 million hectares of country and 187 million trees had been removed by the end of 1984."[138] The detailed progress reports have been presented at successive conferences of

[137] Posnette, A.F., "*Transmission of Swollen Shoot Diseases of Cocoa*." Tropical Agriculture Trinidad 17: 98, (1940).
[138] Legg, J.T., "Cocoa Swollen Shoot Disease – Know Your Enemy." Proceedings of the Fifth International Cocoa Research Conference, Ibadan 1975, 397-402, (1977).

the Cocoa, Chocolate and Confectionery Alliance (1948-61), at the later series of International Cocoa Research Conferences (1965-84) and elsewhere."[139]

New Product Development

Through research and innovation, CRIG has gone the extra mile by embarking on the conversion of cocoa bio-waste into usable commodities for the cocoa industry and other allied industries. These achievements Dr. Frank opined that they emanated from the desire of the establishment to give additional income to the cocoa farmer.[140] Therefore what this study describes as cocoa bio-waste such as the empty cocoa pods, the slated cocoa beans which is locally called *Abinkye* and the fermented liquid. This usable resources were achieved through continuous research by the New Product Development Unit. This analysis Lloyd Brobbey further substantiated in a personal interview that *taking the cocoa pod itself the part that the farmer can benefit from as it stands now is the bean, the rest of the pod is going out waste. The beans constitute a maximum of 40% of the whole fruit. This means that with the exception of those that the Alata Samina is made from, about 60% is going out waste. About two decades ago we started this research of adding value into cocoa so now as you said from the pod we came up with fertilizer, the animal feed, we also make the soap from the discarded bean which farmers would call abinkye cocoa. We also came up with soap and the body pomade for the skin. If you have been to the farm to observe fermentation, the liquid that comes out, that is the pulp juiced is also being turned into the alcoholic beverages you mentioned like Gin,*

[139] Ibid., 397-402.
[140] Personal interview with Dr Frank Amoah – Executive Director of CRIG on 13th October, 2018,

Brandy, Wine and Vinegar but these items are commercialised.[141] The development of such new products has also encouraged other interested entities to go into the business of producing usable commodities from cocoa bio-waste on commercial basis to improve their livelihood. The production of pectin, alcoholic liquor and other alcoholic beverages, animal feed, jelly, soap and cosmetics are now the by-product from cocoa waste. Research and innovation underlie their very outcomes.

In addition, there are other innovations brought to bear by the centralisation of the cocoa research institute achieved through research such as the introduction and testing of Amazon cocoa, the development of early bearing and high yielding seedlings by crosses between Amelonado and Amazon Cocoa. The farmer now has understanding of the relationship between cocoa shade, nutrition and yield and ensures that cocoa farms are adequately aerated. The development and introduction of agronomic packages guaranteeing high yield over three tonnes per hectare. It has also disseminated mass hand pollination to individual cocoa farms to ensure bumper harvest among others are striking innovations the establishment has brought forth into the industry.

Summary of the chapter

The chapter has delved into the different facets that the research institute went through and the crucial roles it has played in bringing innovation into the industry. It is instructive from the narrative that through the centralisation of the research institute, which has led to innovations such as the Development of early bearing and high yielding WACRI Series II hybrids through a cross fertilisation between the Amelonado and Amazon cocoa

[141] Ibid., 397-402

species. The understanding of the relationship between cocoa shade, nutrition and yield, the development of agronomic packages guaranteeing yield over three tonnes per hectare. Mass hand pollination of clonal seed gardens for large scale production of seed pods, understanding of cocoa fermentation and flavour chemistry and short-term control of a severe type of black pod disease, and production of pectin, alcohol and alcoholic beverages, animal feed, jelly, soap and cosmetics as by-products from cocoa waste among other innovations have all emerged from the research made by CRIG.

CHAPTER FOUR

THE IMPACT OF THE RESEARCH ON GHANA'S COCOA INDUSTRY.

Introduction

The establishment of the Cocoa Research Institute of Ghana (CRIG) has impacted on the cocoa industry and the socio-economic life of the people which are both positive and negative. However, for the benefit of this study, the section has attempted a discussion of the positivities of CRIG's establishment on the cocoa industry and the impact on the socio-economic life of the people of Ghana and beyond. The section also relied heavily on data from secondary sources such as reports, periodicals and thesis from both online and print sources and supported it with some interview data which assisted the section to do a narrative of the impact of CRIG's establishment on the cocoa industry and socio-economic life of Ghanaians. However, it also instructive to note that despite the positivities that come with the institutionalisation of CRIG, the establishment has also bedevilled the industry and society with certain problems such as child labour and forced labour issues which the section faintly touched on. The discussions that follow have therefore been devoted to the positive impact of CRIG's establishment in the cocoa industry and allied establishment and the society as a whole.

The impact of CRIG on the cocoa industry

The narrative on how the institutionalisation of research has influenced the cocoa industry can be seen in themes such as adoption of improved varieties, the crop has

emerged as a leading producer among the other cash crops produced in the country it has improved fertilizer usage; hybrid cocoa varieties have been adopted, and effective pests and disease control among others.

The introduction of research into the cocoa industry in Ghana in the 19th century, has observably affected the cocoa industry. In fact research caused the industry to undergo a series of major expansions and contractions. These changes Ruf and Siswoputranto[142] "describe as cycles and further suggest that cycles are intrinsic to cocoa production because the cocoa industry was and is still being influenced by environmental factors such as unavailability of forest land; ecological factors such as deforestation, outbreaks of diseases, and geographic shifts in production; and economic and social factors such as migration."

Introduction and adoption of improved cocoa varieties in the industry.

The introduction and adoption of Hybrid cocoa species in 1984 through the government's initiative has taken over the older *Amazons* and *Amelonado* strains in two fold. First and foremost, the breeding of cocoa trees that produces fruits in three years comparable to those that were bearing fruits in five years for varieties that produces more pods per tree. This narrative an informant concurred in a personal interview that *the first cocoa Tetteh Quarshie brought as you are aware and as history tells us was called Amelonado which was taking about 6 to 8 years to start to bear fruits but now what we have in the system is a Hybrid called Akokora bedi. It takes two years to start to produce fruits and going to*

[142] Ruf and P. S. Siswoputranto., *Cocoa Cycles: The Economics of Cocoa Supply.* Cambridge, U.K.: Woodhead Publishing Ltd, 1995.

commercial production after three years. So all the way from 8 coming to 2 is a whole lot but in terms of production the hybrids are all year round not like the then amelonado which you can get it once or twice a year.[143] However, hybrid cocoa trees perform better than the older cocoa varieties, in the sense that they call for a weather conditions that is the finest and also necessitate improved farm practices like the chemicals application, adopting new planting techniques, pruning, and spraying.[144] The hybrid cocoa varieties also ensure bumper harvest all year round to the extent that even at the end of the farming season.[145] Notwithstanding the increased labour input for hybrid cocoa trees management, farmers have overwhelmingly accepted them. For instance, around 1989, only 10 percent of cocoa grown in Ghana constituted the high yielding strain.[146] But by 2002, 57 percent of farmers in the main cocoa producing hubs were growing hybrid varieties.[147] Traditional varieties of cocoa as reported are gradually disappearing completely on farms cultivated after 1995 through continuous and increased research into the best varieties to be adopted.[148] The establishment has embarked on an aggressive disease and pest control exercise, the swollen shoot virus and capsid control in recent years which yielded result. An instance can be said of when Cocobod initiated nation-wide free cocoa mass spraying program in 2001, about 93 percent of cocoa farmers who took part in a survey conducted in 2002 affirmed that the improvements in their yield per

[143] Interview with Mr. Lloyd Brobbey a CRIG official on 14th October, 2018 at New-Tafo, Akyem.
[144]Shashi Kolavalli and Marcella Vigneri (2017) *The cocoa coast: the board managed cocoa sector in Ghana* - International Food Policy Research Institute: Accra.
[145] Boahene, K., T. A. B. Snijders, and H. Folmer.. "An Integrated Socio Economic Analysis of Innovation Adoption: The Case of Hybrid Cocoa in Ghana." *Journal of Policy Modelling* 21 (2): 167–84, 1999.
[146] Nyanteng, V. K., "The Prospect of the Ghanaian Cocoa Industry in the 21st Century." Paper presented at the International Conference on Cocoa Economy, Bali, Indonesia, October 19–22, 1993.
[147] Vigneri M., "Trade Liberalisation and Agricultural Performance: Micro and Macro Evidence on Cash Crop Production in Sub-Saharan Africa." DPhil thesis, University of Oxford, Oxford, United Kingdom, 2005.
[148] Edwin, J., and W. A. Masters. "Genetic Improvement and Cocoa Yields in Ghana." Working Paper, Purdue University, West Lafayette, IN, 2003.

hectare can be attributed to such initiative .[149] In addition, another set of cocoa farmers' indicated that the harvest seasons 2002 and 2004 was the time that almost all farmstead received some amount of spraying. Cocoa farmers reported that they could recall an average of more than four rounds of spraying applications during the said crop year, out of which 46 percent were undertaken by the government on the advice of a research outcome disseminated by CRIG.[150] The outcome of all these is best practices which has resulted in an increased yield of the farmer by about 30 percent in the 1980's.[151] The foregoing brought about a big jump in the productivity which occurred in the 1980s, which exactly tallies with the year government rolled-out rolled intervention under the ERP.

Cocoa has emerged as a leading cash crop in Ghana.

The widespread nature of the golden Cocoa was boosted by the movement into the southern part of Ghana in the 1850s by peasant farmers from the districts of Akuapem and Krobo, who migrated to the west of the Akyem state to purchase farmlands from the vast untilled forest ochrosol soil from land owners for their cocoa business.[152] It is on record that the conditions that motivated the movement of these Akuapem peasant farmers to buy land for cocoa was as a result of a downfall in palm oil prices after 1885. This gingered peasant farmers to explore for another cash crops; an increase in rubber exports in 1890, which provided money for the procurement of an untilled land. The

[149] C. Steedman, "Agriculture in Ghana: Some Issues," (Unpublished paper, World Bank, Washington, DC, 2003)
[150] Vigneri, "Trade Liberalisation.
[151] Shashi Kolavalli and Marcella Vigneri *The cocoa coast: the board managed cocoa sector in Ghana* - International Food Policy Research Institute: Accra, 2017.
[152] P. Hill, *The Migrant Cocoa Farmers of Southern Ghana. A Study in Rural Capitalism*. Cambridge, UK: University Press, 1963.

higher population density in the Akuapem area, also accounted for the exodus of these peasant farmers to go further into the hinterlands in search of a substitute export agriculture commodity; as well as the establishment of European produce buying companies on the coast of West Africa who were prepared to buy the new crop and export them into the West.[153] The resultant effect has been the emergence of three social classes namely land-owning farmers, peasants, and labourers from exodus of these peasant cocoa farmers. Initially, these peasants didn't have enough money with which to acquire the land. They therefore embarked on share cropped arrangement with earlier settlers under a system called *abusa*, in which labourers were paid one-third of the sales price of the harvested cocoa. In addition, the arrival of migrants from far distant places such as Burkina Faso, Niger, and Mali, who came into the scene as result of the remuneration that cocoa cultivation offered producers in the cocoa producing hubs. These growing populations of cocoa farmers plough back their profits from cocoa production in the western end of Ghana's forest zone by swiftly moving their production into the Ashanti and Brong Ahafo regions, and consolidating to acquire land for further production.[154] The rapid expansion of transportation infrastructure in the 1920s and the emergence of the cocoa marketing by Ghanaian middlemen, cocoa earnings accounted boosted productivity to about 84 percent of the country's total exports around 1927. The inter-war period caused a slowdown in cocoa production, caused by a reduction in demand and problems with the transport infrastructure.[155] At a point in time, the

[153] C. Gunnarsson, "The Gold Coast Cocoa Industry 1900–1939. Production, Prices and Structural Change." PhD thesis, Department of Economic History, Lund University, Lund, Sweden, 1978.
[154] Shashi Kolavalli and Marcella Vigneri, *The cocoa coast: the board managed cocoa sector in Ghana* - International Food Policy Research Institute: Accra, 2017. See Also Gareth Austin, *Labour, Land and Capital in Ghana: From Slavery to Free Labour in Asante, 1807–1956*. University of Rochester Press, *,2005.*
[155] Ibid.

outbreaks and spread of pests and diseases (swollen shoot virus in particular) reduced the tonnes of cocoa produced especially in the Eastern region which was a major hub of production in the early years around the 1940's. This ensured the spread of cocoa production further into the western Brong Ahafo areas and Ashanti.[156] Production dwindled but rose up again during the second half of the 1940s but concentrated in the Western region. To receive the benefits that come with international marketing, in 1947, the colonial government set-up the Cocoa Marketing Board (CMB) empowered it with a monopoly over the purchase of cocoa beans. It was up until 1951 that a greater part of profit made by the CMB went into government assets, which were then invested in the interest of the public.[157] Then in 1961 cooperative societies were given the monopoly right to purchase cocoa replacing the network of private agents, brokers, traders, and middlemen who were previously in-charge of internal marketing of cocoa beans.

Beckam[158] indicated that, "it was the Convention People's Party (CPP) government that benefited from the extremely favourable post-war market conditions and accumulated cocoa income on a massive scale following the sharp increase in market prices in the 1950's. Farmers were paid two to three times more than they received before the war. Between 1947 and 1965, the government collected almost one-third of the total value of cocoa export as export duties."[159] The then government raised duties and rolled out

[156] Amanor, K., "Family Values, Land Sales and Agricultural Commodification in Rural Ghana." *Africa* 80 (1): 104–125, 2010.
[157] Brooks, J., A. Croppenstedt, and E. Aggrey-Fynn., "Distortions to Agricultural Incentives in Ghana." Agricultural Distortions Working Paper 47, World Bank, Washington, DC, 2007. See also Addo-Fening, R., *and Akyem Abuakwa 1700-1943: From Ofori Panin to Sir Ofori Atta.* Trondheim: Department of History, Norwegian University of Science and Technology, 2001.
[158] Beckman, B., *Organising the Farmers: Cocoa Politics and National Development in Ghana.* Uppsala: Scandinavian Institute of African Studies, 1976.
[159] Shashi Kolavalli and Marcella Vigneri, *The cocoa coast: the board managed cocoa sector in Ghana* - International Food Policy Research Institute: Accra, 2017.

strategies to take a much larger share of cocoa revenue by means of a graduated ad valorem tax that increased the average selling price per ton of cocoa. In the government's quest to extend its influence to the rural sector, in 1953 it created the United Ghana Farmers' Council (UGFCC), which was operational in the major cocoa growing hubs despite the fact that it was responsible to cater for farmers' desire across the country. The UGFCC made the sole purchaser of cocoa made it possible to organize farmers under one umbrella to support the government agenda. But cocoa export tax was upwardly adjusted after the last election of 1954, while the producer price remained at the same level for four continuous years. In so doing, after the government had won the third political victory, it again adjusted upwardly its share of cocoa proceeds by negatively adjusting producer prices to the 1954 levels. It also got a "voluntary contribution," announced by the UGFCC on behalf of cocoa farmers, "to share the burden of the Second Development Plan at a time when the government was also receiving soft loans from the CMB. These events made it obvious that by then the CMB had been transformed into an instrument of public finance." The accrual of windfall profits from high cocoa prices at the time also had had important fiscal implications on Ghana's economy in those days and government's expenditures increased upwardly over the 1950s.[160] The government rolled-out a number of strong restrictive measures such as an upward increase in taxes, foreign exchange controls, and a comprehensive import licensing upon the realisation that its foreign exchange reserves is falling but its budget deficit rising upward. The severity of these actions made the government politically unpopular, chiefly from cocoa farmers who had been adversely affected by the falling producer prices and by the change from

[160] Ibid

the compulsory saving scheme into a more explicit export tax.[161] In the second half of 1964, it was revealed that the world cocoa price sharply changed negatively with a bumper crop harvest in British West Africa. Ghana alone recorded an unprecedented production thousands of tonnes of cocoa. Therefore, after the purchasing and marketing costs of the CMB and UGFCC were footed, practically nothing was left for the government, and the CMB's liquid assets were nearly dried-up.[162] In order to get its needed expenses, the government started printing currency notes and minting coins, which resulted in about 35% increase in inflation from October 1964 to July 1965. In response to such market forces, cocoa producer prices were decreased to the lowest levels in the following years. The implementation of such highly preventive actions denoted a shift in the fortunes of the government, which inevitably led to the removal from office of the Nkrumah government in 1966 by the National Liberation Council (NLC).[163] But there was another sharp change of world cocoa prices in 1965 which caused another downturn.[164] The real producer prices reduced steadily through the 1960s because there was inflation which was generated by the government's printing of currency notes to compensate for loss of revenue from cocoa and the introduction of an exchange rate policy that caused the heavy overvaluation of the *cedi*. Coming down to 1983, the market exchange rates toppled for 44 times the official rate. Between 1970s and early 1980s, it was estimated that as much as 20 % of Ghana's cocoa produce had been smuggled into neighbouring Côte d'Ivoire.[165]

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[161] Ibid
[162] Ibid
[163] Ibid
[164] Stryker, J. D., "Trade, Exchange Rate, and Agricultural Policies in Ghana." *World Bank Comparative Studies*, World Bank, Washington, DC, 1990.
[165] Bulíˇr, A., "Can Price Incentive to Smuggle Explain the Contraction of the Cocoa Supply in Ghana?" *Journal of African Economies* 11 (3): 413–39, 2002.

But in the meantime, the aging cocoa trees and the non-stop spread of disease made investment in cocoa not attractive *to write home about*. In the meantime, the settler farmers in the old cocoa production hub discovered that sales prices barely covered their costs, gradually moved away from cocoa to cultivate foodstuffs.[166] The production of cocoa reduced to a minimum of 159,000 tonnes in 1982/83, and a mere 17 % of the total world volume, went down from the 36% in 1964/65. The National Liberation Council instantly quashed the operations of the UGFCC and made the Produce Buying Company a subsidiary of the CMB. After that, producer prices were appreciably increased and farmers were paid a bonus for top grade cocoa beans to increase appreciably the quality of cocoa being sent to the international market. Then the Busia government assumed power to devalue the cedi and the price of cocoa remained same in the face of unchanged real producer prices that remained at their 1950s levels. The government took advantage of the windfall profits from high cocoa prices in the seventh decade of the 20th century to enable a rapid expansion of public expenditure. But in 1971, Busia's government toppled in a coup d'état by the Acheampong-led National Redemption Council. In the light of the high world cocoa prices, the NRC administration was at first not able to give attractive prices to farmers without cutting public revenues, creating positive incentives to production. However, progressively deteriorating balance of payments situations propelled by inflation and later ignored subsequent increases in real wages, producer prices, and other real incentives. With the fall in world cocoa prices in the mid-70s, the general macroeconomic picture began to deteriorate. Cocoa revenue went from 46 percent in 1974 to 23 % in 1979 and into decreasing values from 1980 to 1981 because of

[166] Amanor, K., "Agricultural Markets in West Africa: Frontiers, Agribusiness and Social Differentiation." *IDS Bulletin* 36 (2), 2005.

the exchange rate. The NRC government was again toppled in July 1978 which led to the devaluation of the cedi the second time in a very strict and unfriendly in manner which led to an increase in cocoa prices.

Cocoa production reduced to its lowest level ever subsequently. The internal situations that led to the decline in Ghana's cocoa sector happened in response to an international situation that led to an increasing supply of cocoa from new producers such as Indonesia and Malaysia as well as increased production in Côte d'Ivoire and Brazil. In the same vein, the early 1970s Ghana witnessed a situation. Most of its cheap labour from neighbouring Burkina Faso and Côte d'Ivoire became attracted to Côte d'Ivoire because they felt reluctant in Ghana. Most importantly in neighbouring Ivorian regions, migrants cocoa farmers were granted access to own land from 1983 to 2008. The success happened in Ghana's cocoa industry upon the implementation of the ERP which aimed at reviving the cocoa sector of Ghana. (the Cocoa Rehabilitation Project).

As part of the Cocoa Rehabilitation Project, farmers were handsomely rewarded for removing swollen shoot infested trees and for planting new cocoa seedlings. This initiative brought about a substantial rehabilitation, which resulted in the planting of higher-yielding cocoa tree strains developed by CRIG through research and innovation. In effect, productivity started increasing by tonnes upon tonnes and kilograms per hectare. Then in 1992 when Cocobod[167] turned its responsibility for internal cocoa procurement to some six private companies known as licensed buying companies which reduced its staff strength by 90 % from 1992 to 1995. There was growth in cocoa industry in the year 2001, which was motivated possibly by factors such as higher world cocoa prices was recorded, farmers received a greater share of the price. COCOBOD also

[167] Note that CMB was renamed as COCOBOD in 1984.

rolled out and a set of interventions such as mass spraying exercises and high-tech subsidy packages to promote the adoption of higher and more frequent applications of fertilizers to improve farming practices. These were interventions driven by CRIGs research dissemination.[168] It was also reported that farmers in neighbouring Côte d'Ivoire also started to smuggle their produce to benefit from this intervention.[169]

Promotion and increased use of cocoa fertilizer.

The application of fertilizer on Ghanaian cocoa farms has considerably increased since the 1990's. Researches carried-out among cocoa farmers in the three main cocoa producing hubs in Ghana showed that fertilizer application rates increased from 9 % to 47% from 1991 to 2003. Despite the fact that the quantity of fertilizer used lessened from the 1991/92 to 1997/98 crop years, the percentage of cocoa farmers applying fertilizer increased. This might be due to the possibly from liberalisation of farming input on the markets in 1996/97, which removed subsidies and rather improve private distribution.[170]

Cocoa and the Ghanaian economy

The COCOBOD News of April 2007 described cocoa as the *"cash crop whose foot print is seen in every aspect of life in Ghana."* Indeed, cocoa has been the mainstay of the Ghanaian economy for more than six decades. Its impact has been seen throughout the length and breadth of the Ghanaian economy among farmers, licensed buying companies,

[168] Vigneri M. and P. Santos, "What Does Liberalization without Price Competition Achieve? The Case of Cocoa Marketing in Rural Ghana." IFPRI-GSSP Background Paper 14. International Food Policy Research Institute, Washington, DC, 2008.
[169] Brooks, J., A. Croppenstedt, and E. Aggrey-Fynn, "Distortions to Agricultural Incentives in Ghana." *Agricultural Distortions Working Paper 47*, World Bank, Washington, DC, 2007.
[170] Ibid

transporters, manufacturing, education, health, and foreign exchange earnings.[171] It is estimated that the industry employs about 720,000 to 800,000 families at the farmer level in about six out of the ten regions nationwide. This is just a single industry providing the largest direct employment to Ghanaians. The Licensed Buying Companies also bring markets to the door step of farmers thereby making life simpler for the cocoa farmer. There are also some secondary industries processing cocoa beans into semi-finished product and hence contribute in adding value to the bean before exported to increase the foreign exchange earnings. Cocoa transportation from the farming to the ports by road has also contributed to improving that sector of the economy and thus is involved in the fixing of cocoa producer price.[172]

In education, the Ghana Cocoa Board award scholarship to brilliant but needy wards of cocoa farmers. This scholarship scheme has been in existence since 1951 and a great number of Ghanaians have benefitted from the scheme. The scholarship scheme was about GH¢500,000 in 1996.[173] The Ghana COCOBOD, as part of its contribution to education, set up a Cocoa chair at the University of Ghana with an endowment amount of $500,000 in the year 2007.[174] Ghana COCOBOD has also been very proactive in the health sector. It has established three cocoa clinics in Accra, Kumasi and Tafo which attends to the health needs of their staff and the general public. The Ghana COCOBOD also built the Mampong Akuapem hospital in 1961 in honour of Tetteh Quarshie, the man credited to be the "originator" of the cocoa industry in Ghana.[175]

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[171] "Our Concern – Social Responsibility." Ghana Cocoa Board, Executive Diary, 57-58, 2009.
[172] Editorial. "Cocoa is Ghana, Ghana is Cocoa," Ghana Review International, Cocoa Edition, Issue No. 117. London, New York, Accra. 9, 2006.
[173] Ibid., 9.
[174] Ibid., 9
[175] Ibid., 9.

The cocoa industry in Ghana generates about $1 billion annually as foreign exchange[176] and it is also provide a greater part of Government Revenue and GDP.[177]

Despite its contribution to the economy of Ghana, the industry's operations have not always been rosy at all. For instance, in the 1964/65 cocoa season, a total of 580,000 tonnes of cocoa were produced.[178] This constituted about 33% of the total global market share. This means that Ghana became the largest producer of cocoa in that year.[179] But the industry produce dwindled for almost two decades. The production figures decreased to about 158,956 tonnes in 1983/84 which was an all-time low record and it constituted just about 9% of global cocoa production.[180] It was in 1999/2000 that the industry started showing signs of resuscitation.

The Cocoa industry's productivity and competitiveness

Though the industry has benefitted from technical changes in terms of production, the country needs to close a large productivity gap to remain in the competition of the world market. It is estimated that the gap between observed and achievable yields is 50-80 percent,[181] per the production practices adopted by farmers (for example, thin shading and the amount of fertilizers applied). A research carried-out in the 1980's, brought to bear that Ghana's cost of producing cocoa was the lowest in the world.[182] But Ghana's yield was low comparable to its major competitors which are Indonesia and Cote D'

[176] "Cocoa is Ghana, Ghana is Cocoa," Ghana Cocoa Board, Mini Diary, p.14, 2009.
[177] Ibid, 14.
[178] Editorial. "Celebrating 60 Years of Total Support for Nation Building."
[179] Ibid.
[180] Ibid.
[181] Gockowski, J., "The Analysis of Policies, Productivity and Agricultural Transformation in the Cocoa-Producing Rural Economies of West Africa." *STCP Technical Report Executive Summary*, 2007.
[182] Bloomfield, E. M., and R. A. Lass, "Impact of Structural Adjustment and Adoption of Technology on Competitiveness of Major Cocoa Producing Countries." Working Paper 69. Paris: Organisation for Economic Cooperation and Development, 1992.

Ivoire. Moreover, it has not been agreed as to which technologies aimed at increasing productivity are attractive to farmers. For instance, farmers may not have much incentive to apply fertilizers to hybrid trees, because the profits from doing so may not be higher than those achieved from traditional varieties.[183]

But on experimental farms, application of fertilizers to young trees has increased yields as much as threefold.[184] One assessment suggested that the high dropout rate from the CAA programme may result from high variability in the expected returns from fertilizer applications.[185]

The low level of tree replanting is an additional threat to the sustainability of Ghana's cocoa production. Often, farmers find it more economical to expand their farms rather than to replace old and diseased trees.[186]This is because it takes twice as long to clear an old farm as it does to clear new forest land.[187] Additionally, farmers regard the expansion of land on which cocoa is planted as both an investment and a means to establish land ownership. According to Amanor, "given that migrants and share croppers represent an increasing share of the cocoa-farming population. This dual view means that many farmers seek to acquire permanent land rights by expanding into uncultivated land, where

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[183] Edwin, J., and W. A. Masters, "Genetic Improvement and Cocoa Yields in Ghana." *Working Paper, Purdue University*, West Lafayette, IN. 2003.

[184] Gockowski, J., and D. Sonwa, "Biodiversity Conservation and Smallholder Cocoa Production Systems in West Africa with Particular Reference to the Western Region of Ghana and the Bas Sassandra region of Côte d'Ivoire." Draft paper, Institute of Tropical Agriculture, Ibadan, Nigeria, 2007. Accessed from: http://www.odi.org.uk/events/2007/11/19/434-paper-discussion-biodiversity-conservationsmallholder-cocoa-production-systems-west-africa.pdf. on 14th September, 2018

[185] Opoku, E., R. Dzene, S. Caria, F. Tea, and A. Zeitlin, "Improving Productivity through Group Lending: Report on the Impact Evaluation of the Cocoa Abrabopa Initiative." Centre for the Study of African Economies, University of Oxford, Oxford, United Kingdom. http:// www.csae.ox.ac.uk/output/reports/pdfs/rep2008-01.pdf.

[186] Vigneri M. "Trade Liberalisation and Agricultural Performance: Micro and Macro Evidence on Cash Crop Production in Sub-Saharan Africa." DPhil thesis, University of Oxford, Oxford, United Kingdom, 2005.

[187] Masdar Ltd., *Socio-Economic Study of the Cocoa Farming Community*. Wokingham, United Kingdom, 1998.

land ownership is established by clearing land and planting new trees."[188] Further opportunities to increase production by land expansion may be limited, though, by the decreasing availability of virgin forest land.

A technical revolution in the cocoa industry

The gains from Ghana's agricultural productivity since 2001 have been generated by export crops. Out of this, cocoa accounts for about 10 % of the total crop and livestock production values[189] and contributed about 19% in 2001 to about 28% of agricultural growth in 2006. In the same vein, economic growth has been rising steadily from an average of more than 5% 2001 to 6% in 2005-06. Citizens now have greater access to education, health services, and land ownership.[190] This rate of growth has resulted in a a near reduction by 50% of the national poverty rate since the beginning of the 1990s, from 51.7% in 1991/92 to 28.5 % in 2005/06.[191] Over the years, cocoa farmers have revolutionized their modus operandi of acquiring land and labour which is a direct response to the changing production conditions. In the early 1940s, when production factors such as land and labour were in adequate supply, hence large farms were in a position to attract rural workers to establish new farms by selling them small plots of land. This arrangement saw the settlers' family members moving with him to help him to establish and maintain the new farms. When land started becoming scarce in somewhere in 1965, share cropping arrangements began replacing land sales. Again, when the cost of

[188] Amanor, K., "Family Values, Land Sales and Agricultural Commodification in Rural Ghana." *Africa* 80 (1): 104–125. 2010.
[189] World Bank., *World Development Report: Agriculture for Development*. Washington, DC:World Bank. 2007a.
[190] World Bank.. "Country Brief: Ghana." World Bank, Washington DC, 2008.
[191] Breisinger, C., X. Diao, S. Kolavalli, and J. Thurlow, "The Role of Cocoa in Ghana's Future Development." IFPRI Background Paper 11, IFPRI, Ghana, 2008.

hiring waged workers became increased, farmers resorted to alternative forms of labour among informal labour groups known as *nnoboa*.[192]

Ghana's golden crop received high-repute for its high-quality

Generally speaking, Ghana receives a higher price for its cocoa on the international market. This is due to the fact that "it has slightly higher-than-average fat content; low levels of debris, which results in higher cocoa butter yields than beans containing high levels of debris; and low levels of bean defects, which generate a cocoa liquor flavour preferred by some end users."[193] In addition to these attributes, the cocoa marketing company has played a key role in establishing and maintaining Ghana's reputation for high quality beans. This is achieved by ensuring consistency and reliability of related documentation and shipment of the product.[194] It has been estimated that Ghana's cocoa receives a premium of 3 to 5% relative to La Côte d'Ivoire which is currently the world's largest producer of cocoa. Characteristics that determine the quality of cocoa include content and quality of fat, consistency in the size of the beans, and their moisture content.[195] These classic features of "West African" cocoa flavour is obtained by fermenting beans in a heap under banana leaves for about six days with periodic manual turning and thorough drying in the sun. In order to maintain the quality of the cocoa beans, it is important for cocoa beans to be dried on a raised platform so as to quickly

[192] Blowfield, M, "The Allocation of Labour to Perennial Crops: Decision-making by African Smallholders." *NRI Socioeconomic Series 3*, Natural Resources Institute, University of Greenwich, Kent, U.K, 1993.
[193] Agrisystems Ltd, *"Study of the Cocoa Sector to Define Interventions on Behalf of Ghana's Smallholder with Particular Reference to the Framework of Mutual Obligations*." Prepared for the Stablex 1992 and 1993 Allocation, 1997.
[194] Ibid
[195] Gilbert, C. L., "Cocoa Market Liberalization in Retrospect." *Review of Business and Economics* 54: 294–312, 2009.

decrease the acidity level of the beans. The quality of the cocoa is sustained by quickly conveying well fermented and dried cocoa from the smallholder farmers and immediately shipping them to do away with build-up of moisture, mould and freed fatty acids that can reduce the quality of the beans. Because of the high repute for Ghana's cocoa, the selling of the product becomes quiet easier to the extent that cocoa farmers are paid a fixed price from their produce throughout the year in a forward contract. The amount of investment that multinational firms have made in processing facilities and into Ghana's cocoa industry demonstrate the value that this firms place on the nation's cocoa. It is worthy to note that between 1991 and 2004, the country's export earnings from processed products have more than tripled from 32 million dollars to 105 million dollars. However, due to the restricted condition under which semi-processed cocoa can be transported effectively,[196] it is not quiet clear whether local value adding effort would be adequately beneficial for multinational companies to expand their activities in Ghana. Government policy has rendered the net benefit from processing locally insignificant, especially due to the fact government has placed a limitation on the quantity of low quality beans to be used for local processing which has led to a considerable underutilization of the existing capacity of processing firms in the country. Thus far, informal discussions with the private sector participants indicate that the net benefits from processing locally may not be significant, particularly because the government allows only a limited quantity of low-quality beans to be used for local processing, which has resulted in considerable underutilization of existing capacity in the country.

[196] Fold, N., "Lead Firms and Competition in 'Bi-polar' Commodity Chains: Grinders and Processors in the Global Cocoa-Chocolate Industry." *Journal of Agrarian Change* 2 (2): 228–47, 2002.

Favourable internal and external prices of Ghana's cocoa

Apart from 1998 to 2000 and 2003 to 2006 cocoa seasons, world cocoa prices have steadily increased since 1990. This, combined with a higher share of the price being passed on to farmers, has offered farmers increasing real producer prices. A variety of models estimating the sensitivity of production supply to farm gate prices find that small-scale cocoa producers in Ghana have responded positively to these price incentives.[197] The returns on cocoa farms using the results from two rural research surveys, carried-out in 1996[198] depicted that cocoa production has not been a more profitable venture for farmers. Frankly, the statistics show that cocoa, which usually forms greater part earnings in cocoa-producing households, and accounted for about 67% household revenues, though it does not suggest a trend because they are based on observations for two specific years.

COCOBOD's role in maintaining quality

When it comes to quality practices adopted by national marketing boards in cocoa-producing countries, Ghana's quality continues to be Cocobod's mandate even after its restructuring.[199] The reason for government role in ensuring quality is that cocoa is transported in greater quantity, and poor quality cocoa beans can reduce the quality of other beans in the same cargo, which might affect the price of all beans in the cargo. The continuous execution of this role is essential in the sense that it allows the government to

[197] Vigneri M. *"Trade Liberalisation and Agricultural Performance: Micro and Macro Evidence on Cash Crop Production in Sub-Saharan Africa*." DPhil thesis, University of Oxford, Oxford, United Kingdom, 2005.
[198] Barrientos, S. W., and L. Asenso-Okyere., *"Mapping Sustainable Production in Ghanaian Cocoa: Report to Cadbury*." Institute of Development Studies, University of Sussex, and University of Ghana, 2008.
[199] Fold, N., "Restructuring of the European Chocolate Industry and Its Impact on Cocoa Production in West Africa." *Journal of Economic Geography* 1: 405–20, 2001.

monitor the national reputation of Ghana's cocoa so as to keep its premium in the world market.[200] This arrangement comes at a cost, including the cost of ensuring that lower quality beans are not mixed into those prepared for export and the costs of administration.

The role of Ghana's cocoa in a changing world market.

Ghana is strategically placed to expand its position in high value markets, with Cocobod proving to be very proactive to trends in the global markets. Though these markets offer important opportunities for countries to build competitiveness,[201] they largely remain niche markets because of their limited capacity for expansion. Ghana's considerable progress in the fair-trade cocoa market began with the establishment, in 1993, of Kuapa Kokoo, a farmers' cooperative that operates as a private, licensed buying company. Its share in the domestic market is now estimated to be around 10 percent of total purchases, and a panel survey of farmers spanning 2002 to 2006 shows the cooperative to be farmers' second preferred outlet for selling beans.[202]

How the cocoa industry has impacted economic well-being

Poverty alleviation of peasant cocoa farmers in Ghana.

Increased living income and livelihoods of the cocoa farmer have become keystones in the cocoa conversation. Participation in the industry has attempted to end structural poverty in the lives of cocoa farmers and other labour groups that survived on the income generated from the cocoa industry. The cocoa industry is very important in economic life

[200] Fold, N., and S. Ponte, "Are (Market) Stimulants Injurious to Quality? Liberalization, Quality Changes and the Reputation of African Coffee and Cocoa Exports." In *Globalization and Restructuring of African Commodity Flows*, ed. N. Fold and M. N. Larsen. Uppsala, Sweden: Nordic Africa Institute, . 2008.
[201] Abbott, P. "Towards more Socially Responsible Cocoa Trade." Working Paper 03-3, presented at the Annual, Meeting of the International Agricultural Trade Research Consortium (IATRC), Monterey, CA, December 15–17, 2002.
[202] Vigneri M., and P. Santos, "What Does Liberalization without Price Competition Achieve? The Case of Cocoa Marketing in Rural Ghana." IFPRI-GSSP Background Paper 14. *International Food Policy Research Institute*, Washington, DC. . 2008.

of many West-African nations, it is estimated that about 80% of the world cocoa is produced here and there are millions of peasant cocoa farmers whom cocoa helped to sustain their livelihoods.[203]

In the same vein, Ackah and Aryeetey used data from the 2005 round of the GLSS to demonstrate that cocoa production as an economic venture has exerted positive and significant effects on household incomes as well as food security. It is a revelation that affirms the importance of commercial cocoa farming in poverty reduction.[204]

The predominant share of cocoa in providing for households livelihoods has also reflected pretty clearly in the changes in production and poverty reduction data: the upward trend in quantity produced and portion of sector revenues going to growers. A cursory look at the different rounds of the GLSS data, poverty rates among cocoa growing households have halved, even after accounting for the less dramatic fall in the national statistics observed taking into consideration the rebasing of the new poverty line. The contribution of cocoa to agriculture GDP Ghana remains substantial, as it generated 28 percent of total agricultural growth over the same period.[205] Furthermore, even among those unable to acquire land, providing services to land-owning farmers, cocoa-buying companies and agro-enterprises presents the most promising livelihood opportunities This assertion an informant opines *that I do not have a cocoa farm or own one but because cocoa framers around here always get bumper harvest, so they will need our labour and so they come to hire us to help in the weeding, harvesting of pods among*

[203] Fairtrade Foundation Fairtrade and cocoa. Retrieved from http://www.fairtrade.org.uk/en/farmers-and-workers/cocoa/kuapa-kokoo, 2011. accessed on 12/07/2018.
[204] Ackah C., and Aryeetey, E., eds. *Cash cropping, gender, and household welfare: evidence from Ghana.* Book chapter of Globalization, Trade and Poverty in Ghana. International Development Research Centre (IDRC), 2012.
[205] Marcella Vigneri and Shashi Kolavalli, Growth through pricing policy: The case of cocoa in Ghana Food and Agriculture Organization of the United Nations Rome, 2018.

others. The monies they pay for hiring my labour is what I depend on for supporting my family home[206]

I am an expert "prunner" opined a young man in his mid-twenties. *In order for the adult cocoa trees to do well, their branches that are not useful have to be cut-off to give it free air and light. So I charge these farmers who are mostly women and the elderly. And I depend on this for my survival.*[207] The opinions expressed by the informants above have shed light on how research into cocoa and its resultant improvement in yield have affected their economic livelihood. They do not own any cocoa farmstead but their services are mostly needed by the cocoa farm owners and for that matter have to pay for the hiring of their services. The net effect is that these categories of cocoa workers receive wages from the labour effort exerted into the production process. Gone were the days when the peasant farmer uses his family labour to cultivate cocoa in the Akyem land. But the advent of research and innovation have led to increased yield which the farmers' family labour alone cannot handle and requires other hands whose labour has to be paid for. This narrative, Vigneri and Kolavalli concur that the "Cocoa industry has remained a labour intensive crop and efforts to invest in cocoa production on estates have not been successful in Ghana but it has enabled, earlier, smallholders to intensify production to a greater extent than larger producers have."

Moreover, the introduction of the hybrid cocoa strains developed by CRIG which has been adopted by close to one-third of Ghanaian cocoa farmers who appreciate their high-yielding has also contributed to the improvement in the economic livelihood of peasant cocoa farmers. This is also considered as a direct impact of the research innovation

[206] Interviewed Mr. Emmanuel Ewe at Akyem Afosu on October 15, 2018
[207] Interviewed Mr. Emmanuel Abayateye a cocoa farmer at Tontro near New Tafo, Akyem.

adopted.[208] Appiah also [209] reported that since the introduction and the adoption of the programme in the 2002/2003 farming season, there has been a rise in cocoa yield. A production figure of 417000 metric tons was achieved on record as the second highest production ever that Ghana achieved by 2009.

In addition, it has been estimated that over 90 percent of the world's cocoa production is cultivated by 5.5 million small holder farmers with more than 20 million family members directly dependents on cocoa for a living.[210] Essegbey & Ofori-Gyamfi state that the crop is a major income earner and gives employment to many smallholder households with varying farm sizes of up to 5 hectares.

The Round Table for Sustainable cocoa economy in working paper also tabulated the impact of the innovation inculcated into the cocoa industry as follows:[211]

Poverty alleviation	Strengthen women's position
Improved welfare	Better access to social amenities
Diversify incomes	Renew ageing farming population[212]
Diversification out of cocoa	Attract youth to take over cocoa farms
Improve standards with regards to child Labour	Improve access to schooling and Education

[208] Padi, B. and G.K. Owusu, Towards an integrated pest management for sustainable cocoa production in Ghana. Paper presented at the First Sustainable Workshop on Sustainable Cocoa Growing March 30 - April 2, 1998, Panama City, Panama.

[209] Appiah, M. R., *Impact of Cocoa Research Innovations on Poverty Alleviation in Ghana.* Accra Printing Division, CSIR-INSTI, 2004.

[210] Weiligmann, B., Verbraak, G. & Van, M., Cocoa Barometer 2010, Tropical Commodity Coalition. 2010.

[211] Essegbey, G.O., & Ofori-Gyamfi, E., Ghana Cocoa Industry-An Analysis from the Innovation System Perspective. *Technology and Investment*, (3):276-286. doi:10.4236/ti.2012.34038, 2012.

[212] *Towards a sustainable cocoa economy: overview of farming systems and challenges facing cocoa farmers worldwide* RSCE2 Working Group retrieved from www.roundtablecocoa.org on 14th September, 2018

In a personal communication with Mr Lloyd, he indicated that: *Yes! that I am 100% sure. As you know, research is the backbone of almost everything and without CRIG, I don't know where Ghana's cocoa production would have been. As you are aware, I think that about a decade ago, Ghana was producing less than 500,000 tonnes of cocoa. Around 2010, 2011, it hit a million ton, as at last year (2017) we were at 916,000 metric tonnes. All these achievements are due to the research aspects. I did mention the early planting materials. The first cocoa Tetteh Quarshie brought as you are aware as History tells us was called Amelonado which was taking about 6 to 8 years to start to bear but now what we have in the system is a Hybrid called Akokora bedi it takes two years to start to produce and going to commercial production after three years. So all the way from 8 coming to 2 is a whole lot but in terms of production the hybrids are all year round not like the then amelonado which you can get it once or twice a year*.[213] The above narrative sums up how research and innovation has impacted the cocoa industry and the economic life of the people of Ghana. It is instructive from the narrative that it is indeed research that led to the discovery or hybridization of the early planting material. The farmer can start harvesting in some few years instead of waiting for years for the cocoa tree to grow tall to bear fruits before it is harvested. The net effect of this scientific innovation is within a shorter possible time, the farmer can start harvesting his/her fruits and make great money from its sale to improve his/her livelihood This assertion the Ghana Statistical Service Report of 2015 concurs that "indeed cocoa production is essential to

[213] Interview with Mr. Lloyd Brobbey a CRIG official on 14th October, 2018 at New-Tafo, Akyem.

the health of Ghana's economy because it contributes about 3% to its gross domestic product and also supports the livelihoods of approximately 4 million farming households. [214]It has been proclaimed that *no other country comes to mind more than Ghana when one speaks of cocoa. Likewise, one cannot think of Ghana without thinking of its cocoa sector, which offers livelihoods for over 700,000 farmers in the southern tropical belt of the country*."[215]. Ghana's major export commodity, cocoa has been cardinal to the countries' discourse on development, reforms and poverty reduction strategies since independence. The cocoa industry in Ghana has chopped success. However, after emerging as world's leading producer of the produce, the country experienced drastic decline from the 1960s through to the 70s resulting in a near collapse of the industry in the 1980s. However, production recovered around 1985 after wide economic were introduced. The 1990s therefore mark the beginning of the revival of the industry with production nearly doubling in the early 2000s. These ups and downs within the sector provide interesting lessons worthy for stakeholders to draw inspirations. Cocoa has been used as a source of public revenue mobilisation in various Administrations in Ghana including the colonial administration. As a result of Ghana's experience tenders a recurrent example of policy rehearsal followed by many African countries; tasking the countries major export sector to finance public expenditure.[216]

[214] Ghana Statistical Service (GSS) (2015) '*Annual Gross Domestic Product'*, September 2015 Edition, Accra.(http://www.statsghana.gov.gh/docfiles/GDP/GDP2015/2015_Annual_GDP_September_2015_Edition.pdf on 14 September 2018.
[215] Shashi Kolavalli and Marcella Vigneri, *The cocoa coast: the board managed cocoa sector in Ghana* - International Food Policy Research Institute: Accra, 2017.
[216] Herbst, J. *The Politics of Reform in Ghana, 1982–1991* (Berkeley, CA: University of California Press, 1993), 1993.

Cocoa has reduced poverty and contributed to the growth of the Economy

Aggregate in the southern forest belt where cocoa is produced suggest that through the 1990s, households engaged in cocoa farming as well as mining, timber (the other dominant export oriented activities) and other commercial activities have experienced improvements in their living standards compared with food crop farmers.[217] Poverty reduction among cocoa farmers is therefore obvious. Households surveys show that poverty among cocoa producing households saw a downward turn from 60.1 percent at the beginning of the 1990s to 3.9 percent in 2005.[218]

Summary of the Chapter

The chapter has explored the impact of research and innovation adopted into the cocoa industry. This has been done by doing a discussion of the direct impact of research and innovation on the industry and the improvement in the socio-economic lives of the people. The uniqueness of the contribution of cocoa to the economy of Ghana lies in the fact that the wealth that it created in the industry hinges on the centralisation of research in Ghana. Cocoa provides employment in many rural communities as well as giving cash to many small peasant farmers.

[217] McKay, A., and H. Coulombe, "Selective Poverty Reduction in a Slow Growth Environment: Ghana in the 1990s." *Human Development Network*, World Bank, Washington, DC, 2003.
[218] World Bank, "Ghana: Meeting the Challenge of Accelerated and Shared Growth." *Country Economic Memorandum*, World Bank, Washington, DC, 2007b.

CHAPTER FIVE

GENERAL CONCLUSION

Introduction

This study has explored the *situation problematique* before the institutionalisation and centralisation of research in the cocoa industry to arrive at a new perspective on the subject under study. This was addressed by taking into cognizance different perspective from authoritative sources as well. Moreover, it also grounded the thesis in the innovation systems theory which enabled the study to identify the interplay of the different innovation actors in the institutionalisation of research into cocoa in Ghana. The impact of research in the socio-economic life of the people of Ghana has also been explored among others.

Summary of findings

In relation to the first research question which sought to explore the *state of research into cocoa in Ghana before 1938*, the study found that there were issues with the general cultural practices employed in cocoa cultivation and harvesting respectively which needed remediation. Specifically, there were issues with the sanitation and cultural issues into cocoa production. They are shifting cultivation destroying forest lands, poor planting methods resulting in low yield, the need to rejuvenate the old cocoa farms, pruning issues, the right control measures to be adopted against pests and diseases among others. This necessitated the need to centralise research which eventually brought innovation into the industry. In addition, the running and administration of the experimental stations of the Colonial Department of Agriculture which were scattered was not economically viable. There were small experimental stations scattered across the Gold Coast Colony

which made research and development in the industry difficult. Moreover, the presence of stations at Kpeve, and Tamale among others was not benefitting the industry in anyway and hence was not economically expedient.

The second research question also attempted to study the role of CRIG in the industry after its establishment. The study found out that it has played recognizable and enviable roles which helped position the industry *world cocoa map* forever. Specifically, CRIG has researched, implemented and disseminated findings that the cocoa husk pod can be fed to broilers up to the 10% level in the diets. It researched into other allied cash crops such as kola and shea butter. Development and distribution of improved planting materials e.g Series II, screening and selection of suitable insecticides and fungicides for mirid (capsid) and blackpod control. CRIG has disseminated knowledge or response to fertilizers and correct agronomic practices that maximise yield. With the varieties in general use and hand pollination to help modify the varieties as well as time and increase production as well as methods of rehabilitating old and abandoned cocoa farms which was considered one of the *situation problematique* to increase yield.

Finally, in relation to the third research question which attempted to study the impact of CRIG on the industry and socio-economic life of the people of Ghana, the study found out that CRIG has impacted to a greater extent the cocoa industry and the socio-economic life of the people. On the part of the industry, CRIG's research innovation affected the industry and ensured that Cocoa has emerged as a leading cash crop in Ghana. There is the promotion and increased use of cocoa fertilizer and has given the industry an advantage in terms of productivity and competitiveness on the international market. Through CRIG, Ghana's golden crop, the cocoa has received reputation as high-quality

cocoa bean. This has led to an increased share of free on board prices going to farmers. The favourable internal and external prices of Ghana's cocoa lies in the fact that research and innovation have led to the improved yield and quality. In terms of its impact on the socio-economic lives of Ghanaians, it has promoted the ordinary Ghanaian from poverty bracket to an appreciable income earner

Indeed the role of Ghana's cocoa in a changing global market that it has impacted positively in the lives of the people of Ghana. It has increased the per capita income of peasant cocoa farmers in their catchment areas.

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Interviews

Interview with Mr. Lloyd Brobbey – the PRO of CRIG on the 14th of October, 2018 at Akyem Tafo.

Interview with Mr. Emmanuel Ewe – Chief Cocoa farmer on the 15th of October, 2018 at Akyem Afosu

Interview with Emmanuel Abayateye, a Chief cocoa farmer on the 16th of October, 2018 at Tontro near New Tafo Akyem.

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