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Financial costs and benefits of investing in domesticated "Sonkyi" (*Allanblackia spp*) in the forest region of Southern Ghana

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Abstract
The integration of "Sonkyi" *Allanblackia spp* into cocoa farming systems has been initiated in Southern Ghana. Currently, it is a collection activity although its domestication is being championed by Unilever R&D Netherlands in collaboration with the Forestry Research Institute of Ghana. Feasibility studies suggest that the venture is viable for farmers if the financial support assurances by Uniliver would be sustained. It is important to assess the feasibility of 'no support' so that those private sector entrepreneurs who want to venture into this activity would understand the real cost and return issues. This paper presents the results of a financial cost-benefit appraisal of AB investment in the Western Region of Ghana. Using alternate viability measures, i.e. Net Present Value (NPV), Benefit-cost ratio (BCR) and Internal Rate of Return (IRR) the results show that the benefits to be derived from the AB investment are quite high; the IRRs range from 26% to 40%. The findings of the study suggest that AB production is a financially viable investment; the only challenge will be how to sustain the sole buyer demand and adequate prices.

Key words: Allanblackia, tree crop, financial benefit-cost analysis, viability, and profitability

1. Introduction

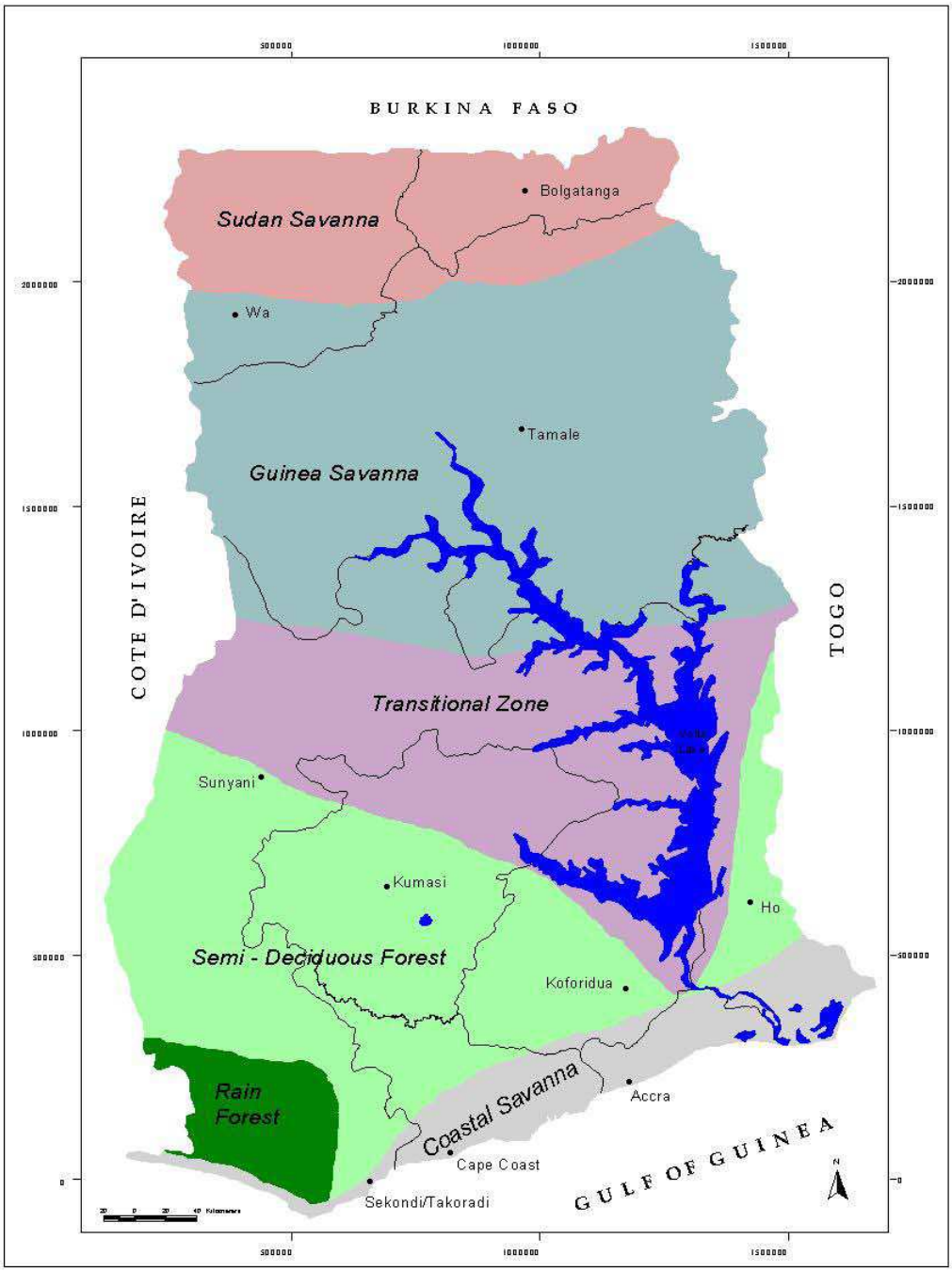
There are four major agro-ecological zones in Ghana: northern savanna, forest-savanna transition, humid forest, and coastal savanna (Figure 1). Each zone is endowed with valuable tree species which are important for the livelihoods of local communities. In the savanna area, the Shea tree is the most important. In the forest zone, recent studies have shown the importance of *Allanblackia parviflora* (AB), called "sonkyi" in local language.[1] AB has been categorized as an under utilized specie because its potential for contributing to food security, health (nutritional/medicinal), income generation, and environmental services is under exploited (Jaenicke and Höschle-Zeledon, 2006). Allanblackia are tree species widely distributed in the forest regions of sub-Saharan Africa. Species such as *A. parviflora* is known in Ghana and Upper Guinea; *A. floribunda* is known inGhana, Nigeria, Democratic Republic of Congo and Angola; *A. stuhlmannii* and *A. ulugurensis* are known and endemic in the Eastern arch mountains of Tanzania (Source).

In Ghana, a national agroforestry programmes since 1988 has incorporated several tree species for plantation forestry and alley cropping. Mangoes and cashew received the widest attention. AB has only recently been identified in the forests and adjoining areas in the Western, Central and some parts of Eastern Regions. Some local people traditionally collected its seeds and used it to make cooking oil and soap for domestic use. Recently, Unilever R&D Netherlands (a private multinational company) discovered its potential use in food products such as spreads (margarine) and its poverty reduction potential among the farmers/collectors in the AB producing area. Seed

[1] See picture in Appendix 1. Allanblackia is a tall evergreen forest tree to 40 m tall, with a straight, occasionally buttressed bole and drooping branches which often conspicuously whorled.

kernels amount to 60-80% of the matured whole seed weight. The unusual hard white fat consists of 52-58% stearic acid and 39-45% oleic acid (www.worldagroforestry.org).

Figure 1: Agro-Ecological Zones of Ghana



Source: Benneh & Aggyepong (1990)

Thus, a partnership was established in 2002 between Unilever, the Netherlands Development Organisation (SNV), the World Conservation Union (IUCN), the Forestry Research Institute of Ghana (FORIG), the International Tree Seed Center (ITSC) and some Non-Governmental Organizations (NGOs) for the establishment and development of a sustainable supply chain for AB seeds in Ghana. The partnership focuses on issues related to natural resource management, community development, equity and gender mainstreaming. The local people are being motivated to collect fruits of wild trees whiles FORIG experiments with its domestication.

There is the belief that those farmers who would take advantage of the newly opened window of opportunity would benefit immensely. The AB supply chain has been established and is functional. Between 2002 and 2007, the purchase price increased from GH¢0.04 to GH¢0.15 per kilogramme of dried nuts[2]. There is the recognition that, without domesticating the plant, the amount of seeds collected currently from the wild by individual farmers would never be substantial enough to make significant contribution to the farmers' income levels and or sustain demand. Volumes collected and supplied to Unilever would also not be commercially meaningful. Thus, the strategy of the partnership is to promote domestication. However, for a significant scale of AB production to unfold through domestication, concrete information was required. These will include economicattractiveness for farmers, the comparison of AB cultivation relative to other farming and economic activities, and methods for gaining and sustaining farmer interest in planting AB on a long term. A study to estimate the farm-level investment and operating cost, cash flow and net returns over a period of 25 years was initiated in 2007 by the World Conservation Union (IUCN) in Ghana. The broad objective of the study was to analyse issues concerning standard setting and sustainable supply chain management. The study showed that AB collection has a positive income generating capacity and exhibit a low opportunity cost of labour. With an incentive package that subsidises all capital investment AB was financially viable at 5% (cost of capital for the farmers involved): The NPV was GH¢333,000 and the IRR was 103%.

What if some farmers or private investors want to understand the real financial opportunities and constraints in AB production? The financial benefit cost analysis that imputes cost to all activities would be needed. The returns to Allanblackia ($/ha, internal rate of return) compared to alternative tree crop such as cocoa which is the most important tree crop in the Western Region today becomes an issue. At a discount rate of 15 percent the NPV for cocoa was estimated at GH¢615,000 and the financial IRR was 120 percent (Egyir, 2007).

The major objective of this study is to use alternate viability measures, i.e. Net Present Value (NPV) and Internal Rate of Return (IRR) to show the financial benefits to be derived from the AB investment. Results of this study will provide information that will help stakeholders understand the commitments necessary to sustain growth and development of "Sonkyi" in Ghana. The rest of the paper is divided into four sections: First, a description of the activities in tree crop farming systems; second, the methodological approach, third the results and discussion and finally, the conclusion.

[2] Unilever sets the price in a "backward calculation" based on the Free on Board (FOB) price of extracted oil in Rotterdam. Transaction costs along the supply chain are deducted from the FOB price to derive the price paid to the farmer collecting the seed (IUCN, 2007).

2. Activities in tree farming systems in the Western Region

Land tenure

Domestication of Allanblackia, a non-timber forest product (NTFP) is dependent on land tenure security. Generally, security of tenure leads to higher productivity and better land management (Panayotov, 1993). Secure tenure reduces farmers' risks, and raises expected profitability by providing proper incentives for farmers to make investments in the long-term productivity of their land. In Ghana, land has both a cultural and market value. Land is held by the present generation for future generations. Thus, most land parcels are communal property and distributed mainly through an inheritance system. There are two major types of inheritance systems in Ghana: patrilineal and matrilineal. The matrilineal system practiced in most part of the forest regions allows both men and women to inherit land. The patrilineal system does not allow women to inherit or own land. By a recent law, land can only be leased rather than outright purchases – freehold. Therefore, the poor and landless (including some women) may gain access to small parcels of land with unsatisfactory rights only if it is family land (with low market value). It is family land which has cultural value and requires low or no cash commitments. Land purchase price and rents are high restricting access by the poor and vulnerable. The tenure system suggests that for sustainable Allanblackia management, issues of restriction of access would need critical attention.

Cropping system

Tree cropping starts as a mixed tree-food farming system. Preparing land for tree crop planting in forest regions means removing other trees. Yet many of the trees not only serve as sources of food and nutrition but also as fuel, fodder, medicine and building materials (timber and thatch) for majority of rural households. In cocoa farms, a few trees (known as "desired trees") are left to serve as shade for cocoa seedlings and immature trees. Cola (c*ola nitida*) is left on farms to provide the nut needs of households who have expertise in processing the nuts for sale. Sonkyi has been left on farms to serve as shade trees for cocoa as well as bait for rodents such as giant rats and brush-tailed porcupines that serve as household protein sources or extra income. The nuts of "sonkyi" are occasionally processed into oil and mixed with palm kernel oil for home consumption. Not many trees of AB are left since they attract too many rodents that tend to destroy cocoa farms. For instance, in the village of Mmerewa, only 30 AB trees were counted on 1,000 hectare farm land. There are many more AB trees in the forest reserves and residents are permitted to create paths or weed around these trees in order to have access to fruits and nuts. There are other plants (shrubs, short trees and climbers) such as "Atooto" *(Griffonia simplicifolia*),"Abesebuo" (*Irvingia gabonensis*), "Abako" (*Tieghemella heckeli*), Mfia (*Eremosphatha sp.*) and "Nsokor" (*Garcinia epunctata*) which serve as sources of additional income for some households and compete for time with AB. Atooto and Abako are seed products of medicinal value, Mfia is a cane product for basket and furniture making and Nsokor is for chewable sticks (brushing of teeth).

With cocoa production, food crops such as plantain, cassava, cocoyam, yam and maize are planted during the initial 2 to 3 years of tree establishment. In a focus group discussion, it became clear that hectare of cocoa land can carry as much as 1,000 cocoa trees. The food crops are intercropped with the cocoa trees and other desirable trees. The food crops serve three purposes: provide shade for growing cocoa seedlings; harvested for home consumption; and the

surplus for income generation. Whiles the market for "sonkyi" is a recent phenomenon that for food crops and other non-timber forest products have matured markets.

The marketing system

Food crop marketing is not institutionalized. Communities and individual households determine the form in which produce will be sold, where to sell, when to sell and at what price. Most food crops are sold in their raw state so they are harvested a few days before the major market day. There is a designated day in a week when one major community, termed the market centre, provides space with minimum facilities, for display and exchange of goods. Due to the high perishability of most food crops, the market is a buyers' market; price is determined through bargaining and haggling.. Cocoa marketing is highly institutionalized. Each community has a buying agent within 20 Kilometres, representing a licensed buying company (LBC) which buys on behalf of the Ghana Cocoa Marketing Board[3]. In October 2007, the producer price negotiated for cocoa beans was GH¢0.95 per kilogramme. Both spot and deferred payments are practiced during the purchasing seasons: The main cocoa crop season begins in October and the light season in June of every year.

AB marketing is institutionalized although not all collecting villages have a buying agent. For instance, of the three villages visited by the IUCN researchers the Mmerewa community did not have an agent within 100 Km. Where there were buying agents, they buy what is offered by individuals, carry out some promotional activities (largely public relations) and make spot or deferred payments during the purchasing months of December to April. The purchasing price of AB in April 2007 was GH¢0.15 per kiligramme. All other collected NTFPs are sold in the open market to buyers who visit during market days. The price per unit is not fixed; it is determined by demand and supply factors. When collection peaks around November-December, **cola could** sell at GH¢0.13 per kilogramme; the price could, however, rise to GH¢8.00 as quantioty available for sale or number of sellers reduce. The prices of "Atooto" and, "Abesebuo" follow the same trend. However, since the individual trees are few on individual farms the combined benefits derived from harvesting these trees is what is of interest to farmers. Table 1 shows the whole farm profit levels for a household with an average of 3 hectares of cocoa farm. At least, 20 percent of tree crop gross profit came from NTFPF with AB contributing only 0.2 percent. This results show that, it is necessary to have more harvested produce to compensate for the low price per unit of AB. This volume increases is the aim of domesticating Allanblackia.

3. Methodological approach

The methodology is described in three parts. First, the conceptual framework; here the thinking is based on basic theories of economics and project appraisal. Secondly, the variable selection and methods of data analysis are discussed. Finally, methods of data collection are examined.

Conceptual explanations

All factors of production are deemed scarce not only because of inadequate supply but also because they could be put to competing uses. Labour use is the limiting factor in the forest regions of Ghana. Land is available and the fairly flexible tenurial system lends itself to

[3] About 19 LBCs were registered in 2006 (Zeithlin, 2006:6). The GCMC is a subsidiary of the Ghana Cocoa Board which is the sole government agency in charge of cocoa research, seed production, quality control and export.

availability and security for a large group of people, including those who have ability to lease. The important factors of labour in tree crop farming systems are time, mental and physical efforts.

Table 1. Mean whole farm profit in survey area in 2006 (¢'000)

Source	Mean revenue (A)	Variable cost (B)	Gross Profit (B-A) = C	Common cost D	% Contribution to sales
1. Allanblackia	35.32	0	35.32	Mats (2) = 500	0.20
2. Abesebuo	924.29	0	924.29	W.boots = 60	6.00
3. Atooto	1,727.05	0	1,727.05	Weeding = 200	11.00
4. Cola	350.00	0	350.00	Others = 280	2.00
5. Cocoa	22,800.00	10,000.00	12,800.00	Total = 1,000.00	80.80
Variable cost for cocoa (3 Ha)	Pesticides = 2,400 Fertiliser = 5,000 Processing (drying)= 2,600 Total = 10,000				
WFP (1+5) – D WFP (1+4 +5) – D WFP (1+3+5) – D WFP (1+2+5) – D WFP (1+2+3+5)-D WFP (1+2+3+4+5)- D	12,835.32 -1,000 = 11,835.32 13,185.32 -1,000 = 12,185.32 14,562.37 -1,000 = 13,562.37 13,859.61 -1,000 = 12,859.61 15,486.67 -1,000 = 14,486.67 15,836.67 -1,000 = 14,836.67				

Source: Egyir, 2007

The labour time allocated is an investment with expected return. In the same vein, the mental and physical efforts in planning and controlling factors of production need to be adequately rewarded. Otherwise, choice makers would opt for better alternatives, including leisure. The latter gives non-economic value but cannot be trivialized by any analyst. People live in social settings that make demands on their labour time. In Ghana, family and friend gatherings for funerals, naming ceremonies, weddings and just conversation are forms of activities that are planned. Thus, for those already in cocoa farming any new venture would be considered a complement to cocoa or substitute to leisure. Cocoa farming has peak and lean labour demand, and newly introduced ventures may be perceived as complements, requiring that free time (or leave period) during lean season will be put to action. It may also mean that even when it is the peak season for cocoa, rest hours within a day will be used for complementary ventures that do not require the same time, mental and physical effort. Where, the resources required in a new venture compete with existing activity both ventures cannot be undertaken. This is where economic opportunity cost analysis becomes necessary. The clear economic advantages in terms of higher returns (based on current and future considerations of money value) would then be considered. The ease or complexity of the activities involved as well as the time period to obtain returns are also important (Rogers 1995). Thus, to the cocoa farmer, the financial analysis of AB would take opportunity cost of reducing scale of cocoa farming or completely switching enterprises. For non-cocoa farmers, it would mean comparing investments in cocoa and other interest bearing assets such as bank time deposit, etc. The latter ignores the non-financial benefits of tree crop investments, though.

Measures of financial returns border on market costs and benefits. The cash flows of costs and benefits arising from projects such as AB investment belong to different time periods, and have to be translated into a comparable series by adjusting for inflation (Ninan et. al. 2000). In addition the time value or time preference of money needs to be considered[4]. Hence, to find out whether benefits of a project outweigh its costs we undertake a viability analysis by computing the present values of the cash flows of costs and benefits through discounting. Calculating present values faces the challenge of choosing appropriate discount rates. A discount rate reflects the riskiness of the project or events leading to the cash flows. One view is that this rate should reflect the opportunity cost of capital; but given the institutional and market rigidities characteristic of developing countries, to arrive at the correct opportunity cost of capital is no easy task (Ninan, Ibid.). It is, however, assumed to vary between 8 to 15% in real terms in developing countries (Gittinger, 1996) accounting for the rate of inflation. A second proposition is to consider the borrowing cost of capital. Many businessmen tap into the domestic financial market to finance projects in Ghana so the going lending rate which is estimated at an average of 19 percent in Ghana could be adopted. The third proposition is that it should reflect the social time preference rate, i.e. the rate at which society weighs future consumption *vis-a-vis* present consumption. This is assumed to reflect the market rate of interest. The maximum interest rate on time deposit for major banks in Ghana is 15% per annum while some non-bank financial institution pay interest rates of up to 20 percent..

It should be noted that the use of a high discount rate discriminates against investments with longer gestation periods and implies that smaller weights are attached to the stream of benefits and costs of future years. But, farmers and most businessmen, have the short-term horizon in view. Private discount rates are, therefore, generally higher than public discount rates. A number of studies have used discount rates ranging between 3 and 6% in real terms(WHERE?), to evaluate public projects such as afforestation that have mainly social benefits (Nadkani et al, 1994; Pearce, 1992). Since AB here is considered a private benefit, in the analysis, we have used a discount rate of 10%, and alternatively at 15% and 20% by way of sensitivity analysis. Another important variable in viability analysis is the economic life of the tree crops.. The IUCN project assumed that a 20 year economic life although Gittinger (1996) suggests 25 years for tree crops in developing countries. Cocoa trees can economically bear for over 30 years and many have seen wild AB trees bear for over 50 years though it may not be economic. Therefore, 25 years has been used for this study.

[4] GH¢ 100 received today will be preferred over GH¢ 100 (even at real prices) received a year later due to time preference.

Empirical model

Two viability measures are computed, viz.,

1. The Net Present Value (NPV) i.e. the present value of benefits minus the present value of costs at 2007 prices where cash flows are summed up for 25 years: Hence,

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_0$$

   Where, r is the discount rate, t is time in years and C_0 is initial investment (land and seddlinf costs only) and C_t is the net benefit in year t.

2. The Internal Rate of Return (IRR) i.e. that rate which equates the NPV to zero. It is equal to the interest rate (r) that makes summed discounted benefits and costs equal.

The calculation of benefits and costs are as follows: Benefits of cropping AB are both in nuts, lumber and environmental soundness. The environmental benefits[5] of the tree crops may take longer to realize, is a public good..; This environmental benefit has not been considered in this analysis because it is more a public good. .What will be the value of the lumber at harvest for building material and or firewood? The estimates of crop yields expressed in value terms used in our analysis are the sum total production. Under AB, food crops such as plantain would also be cultivated; its added costs and benefits are evaluated for the first five years when AB trees are not bearing fruits. Like cocoa, when AB is fully established all food crop cultivation would stop. Investments in AB and food crops would be incurred in the initial 5 years for land rents, seedling, land preparation, weed and pest management and soil fertility maintenance cost. The cash flows of costs and benefits for the project are expressed in 2007 prices[6]. The estimates of the average value of yield and costs per ha for dry AB nuts from the IUCN study, have been used to project and derive the cash flows of costs and benefits of AB production (Table 2).

AB yields on average 57 Kg per tree[7] (valued at GH¢ 0.15 per kg in 2007 prices). The average tree density of AB is about 400 trees per ha. All costs are either paid out or imputed value such as family labour used. For instance, family labour, own land and owned fixed capital are imputed. As part of our sensitivity analysis we also allow for the possibility that prices will be lower than projected. Hence, we allow for an across-the-board 25% reduction in the expected benefits from the AB production. This will test the rigorousness of our estimates under

[5] It lends itself to a more natural, "integrated agroforestry" method of cultivation, as it enthusiastically grows in both virgin rainforest and disturbed agricultural areas (www.resolutionfund.com).

[6] These and other figures at 2007 prices could be converted into USD equivalents taking the official USD-cedi exchange rate for 2007 at GH¢ 1.00=US$0.95.

[7] The IUNC study estimated that each AB tree could bear 120-180 pods per annum and each pod would have nuts with dry weight of 1 Kg (Egyir 2006). Others estimate that each AB tree in Cameroun yielded 40 pods and there were 400 trees on a hectare; 3 pods give 1 Kg seed (Simons, 2006). Hence we take the average of 113 pods (40+120+180) per tree and average of 2 pods per Kg giving a total of 2280 kg per hectare.

alternative scenarios. The financial analysis for cocoa was also at the 3 discount rates. In the case of cocoa, a 25 percent increase in cost rather than decrease in benefit was tested. This is because sometimes government subsidises cocoa inputs such as seed, fertilizer and pesticides.

Table 2: Estimation of costs and revenue from one hectare of AB

Variable	Amount (GH¢)[1]	% contribution
Fixed cost	4,370.40	15
Variable costs	25,111.81	84
Other costs*	353.60	1
Total cost (year 25)	**29,835.80**	
AB revenue	206,496.80	97
Food crop revenue	6,105.10	3
Total revenue year (25)	212,601.90	

Sources?
*****Wellington boots are replaced each other year, drying mats each 5 year (These are thus treated as partially fixed costs)
1. discounted values at X%

Data collection
There are six regions with forest cover in Ghana. There was thus the possibility of studying all of them; in that way any differences that call for special attention would be identified. However, a case study approach was adopted due to logistical and time constraints. The Western Region, in the forest zone of Ghana, was selected. Primary data was collected from key informants (chiefs and elders, district assembly personnel, chief farmers, women's group and youth groups) and a sample of 110 farmers (55 male and 55 female). . Selection of sample was based on simple random sampling of those who were available at the time of visit and were willing to participate in the interview. The key informant interviews were organised for individuals as well as focused group discussions. Each focus group consisted of an average of 10 people and there were 3 groups in each of the three communities visited. The communities were Sewhi-Mmerewa, Mpataho and Kroboase. Questioning was from a questionnaire. Apart from the socio-cultural background, the issues raised bothered on tree crop cultivation, forest products collection, willingness to commit resources to AB production, costs of inputs and services charges, quantities or inputs used and produce harvested per hectare and output prices. Therespondents were aged between 20 and 60 years. There respondents were of diverse ethnic, educational and marital status: 90% are Akan-speaking and the rest are of Northern or Adangbe origin. About 77 percent are married and the literate with 9 years or more of formal schooling make up 52 percent of the sample. About 98 percent of the respondents agreed that it was important to domesticate AB and 86 were willing to commit human and other capital resource to AB cultivation where there is ready market and favourable price for the output.

4. Results and discussion

The information on the costs and benefits from 1 hectare of AB production in the Western Region of Ghana is shown in Table 2. The present value of costs at 10% discount rate for cash flows summed up over 25 years is GH¢46,530. The bulk of the costs incurred in the project is working capital costs and constitutes about 84% of the total costs. Fixed cost components are land rent and AB seedling cost which is about GH¢0.44 million, accounts for 16% of the total costs.. Table 3 presents the NPVs and IRRs for AB at market values discounted at various rates ranged from GH¢26.00 thousand to over GH¢46 thousand, and the IRR was 44%. At a 25% reduction in AB price the NPVs ranged from GH¢ 19.00 thousand to over GH¢ 35.00 thousand and the IRR was 31%.

Table 3: Results of financial appraisal for Allanblackia and cocoa production in the Western Region of Ghana (One ha)

Variable	Discount rate[8]			Internal rate of return (%)
	10	15	20	
	Net present values (GH¢'000)			
Allanblackia	46.53	25.86		44
AB Benefits reduced by 25%	34.90	19.40		31
Cocoa	1,016.40	615.90		120
Cocoa cost increased by 25%	1015.00	825.50	613.70	112

Source: Survey data

The results of two scenarios of financial IRR and six scenarios of NPV in Table 3 suggest that Allanblackia production is financially viable but at a lower level compared to cocoa production. Even the worst case scenario of the AB analysis was viable. The net present value (NPV) over 25 years and at 20% discount rate was GH¢ …thousand and the financial IRR was 31 percent. This means that at 20 percent cost of capital net present value was GH¢X and the average net internal income generating capacity of the AB project was estimated to be 31 percent. This implies at a cost of capital of 31% interest rate the project will break even.

We note that investments in cocoa production appear to be a better investment alternative even when it is assumed that cost could be 25 percent higher than estimated. Presently, cocoa seedlings that could cost GH¢1.50 are supplied by government at GH¢0.15. There is an on-going cocoa pest management programme by the government. This contributes to cost reduction for the cocoa farmer. We see the importance of the producer price factor in the cocoa results too;

[8] Excel used in evaluation

the high producer price appears to compensate for increased cocoa costs. This is shown in the minimum difference in NPV with 25% increases in cost.

Indeed, low AB nut price is the major reason mentioned for non-collection by most cocoa farmers in the villages visited (Table 4). Further analysis of results showed that, only 45 percent of respondents had ever collected AB; in 2006 only 56 percent of the Collectors processed nuts for sale. The poor price incentive was the major cause of the general lack of interest. The other constraints mentioned were non-price but closely related to incentive (in decreasing order of importance), the laborious nature of collection, the distant location of AB trees from residence and rodent attack on AB fruits. The latter situation requires that one remain alert in order to collect only whole pods. It means that the pest management cost would be higher than expected or the yield would be lower.

Table 4: Ranking of Constraints in Allanblackia Collection

Problem	**Sum of Ranks**	**Mean Rank**	Ranks
Low price	270.00	2.62	1
Collection is laborious	419.50	4.07	2
Long distance to collection sites	422.00	4.10	3
Rodents attack	432.00	4.19	4
Lack of trust in buying agents with respect to information sharing	442.50	4.30	5
Delay in payment after sale	446.50	4.33	6
Low material incentives given to collectors	451.50	4.38	7
n (number of respondents)	103		
Kendall's Concordance test *chi-square (corrected for ties)* *Degrees of freedom* *p-value* *W* *avg. rank-order correlation*	 *187.820* *6* *7.40E-38* *0.304* *0.297*		

Source?

Conclusion

In recognition of AB's potential for growth, for improving income, and the natural resource base of the depleting forest zones in the country, "Sonkyi" AB, is being accorded importance by both government and international development partners. The integration of AB is being promoted in the cocoa farming systems in Southern Ghana by Unilever R&D Netherlands in collaboration with the Forestry Research Institute of Ghana and other non-governmental organisations. Domestication in being encouraged to replace the current collection activity. The financial support provided by the Uniliver company makes domesticated AB financially viable. Survey data from 103 farmers in three communities in the Western region show that all scenarios of discount rate (10 to 20%) and benefits for AB production would be viable. The factors that threaten investment include low level producer prices, lack of sustained demand for AB nuts and lack of technology for rodent control. Three implications emerge from these results. **First, potential investors will be required to form a strong negotiating team to ensure that there is**

annual increases in producer prices and that the increase is not below 5 percent. Potential farmers should form a Farmer Based Organization (FBO) to receive technical support and advice from professionals in both governmental and non-governmental organizations. Second; in order to keep producer transaction costs low buying depots should be established within reach of farm fields. Since there are cocoa buying agents in most cocoa communities, negotiating purchasing arrangements with the mother companies of these agencies would be the way forward. Cocoa buying agents could double as "sonkyi" buying agents. Finally, more vigorous research to develop cost effective techniques for managing rodents would be needed.

Bibiliography

Amanor, Kojo Sebastian (2006) Socioeconomic conditions of allanblackia production and perceptions of farmers and collectors. Institute of African Studies, University of Ghana, Legon

Assese, Vincent (2000). "Western Region". In, Ghana we mean business. Democratic, economic and social achievements of focused government (1993-1996). Conafric Ltd. Accra.

Carney D. (1999) Approaches to Sustainable Livelihoods for the Rural Poor, ODI Poverty Briefing No. 2.

Castle,E. N., M. A Becker and F. J. Smith. (1972) Farm Business Management. The Macmillan Company, New York.

Cleaver, K. and G. Schreiber. 1992. The population, agriculture and environment nexus in sub-Saharan Africa, Agfrica Rgion, World Bank, Washington, D.C.

Egyir (2006)
Egyir, I. S. (2007).

Fleischer, Grace. 2002. Effects of agricultural activities of rural women in Sota in the Greater Accra region on the soil, water bodies, and the vegetation. Unpublished M. Phil Thesis. Dept. of Home Science. Faculty of Agriculture, University of Ghana, Legon.

Gerken A, JV Suglo and M Braun. 2001. Crop protection policy in Ghana. Accra, Ghana: GTZ Integrated Crop Protection Project. Plant Protection and Regulatory Services. Ministry of Food and Agriculture, Accra.

Gittinger, J. P. (1996). Economic analysis of agricultural projects. John Hopkins University Press, Baltimore and London.

Gujarati, D.N. (1992). Essentials of Econometrics, McGraw Hill, New York. U.S.A.

Hendrickx, Harrie (2007) "Allanblackia: standard setting and sustainable supply chain management: A commentary on draft report of price setting and marginal cost study. Unilever Holland.

http://www.agrowebcee.net. (2007). Farm Management glossary.

IUNC, 2007). "Allanblackia: standard setting and sustainable supply chain management: The terms of reference for marginal analysis study. World Conservation International. Switzerland.

Jaenicke, H. and Höschle-Zeledon, I. (eds) 2006.Strategic Framework for Underutilized Plant Species. Research and Development, with Special Reference to Asia and the Pacific, and to Sub-Saharan Africa. International Centre for Underutilised Crops, Colombo, Sri Lanka and Global Facilitation Unit for Underutilized Species, Rome, Italy. 33 pp. Kohls, R. L. and J. Uhl (2002). Marketing of Agricultural Products. Prentice Hall, USA.

Kolstad, Charles. D. 2000. Environmental Economics. Oxford Universities Press.

New York, Oxford.

Marioti, S. and T. Towle (2001). Enterpreneurship. How to start and operate a small business. A guide for the young entrepreneur. The National Foundation for Teaching Entreprenuership Inc. NewYork.

McConnel and Brue (1999). Microeconomics: principles, problems and applications. McGraw-Hill Companies Inc., USA.

Mehra, Rekha. 1997. Women's land rights and sustainable development. In: Issues in agricultural competitiveness. Edited by Roger Rose, Carolyn Tanner, and Margot A. Bellamy. International association of agricultural economists.

Ninam et al 2000Nadkarni M.V., Ninan K.N., and Pasha S.A. 1994. *The Economic and Financial Viability of Social Forestry Projects in Karnataka*. Joint Forest Management Working Paper No.16, Society for Promotion of Wastelands Development, and the Ford Foundation, New Delhi.

Opoku, K. (2006) Allanblackia: standard setting and sustainable supply chain management: legal and institutional aspects.

Pana 1993

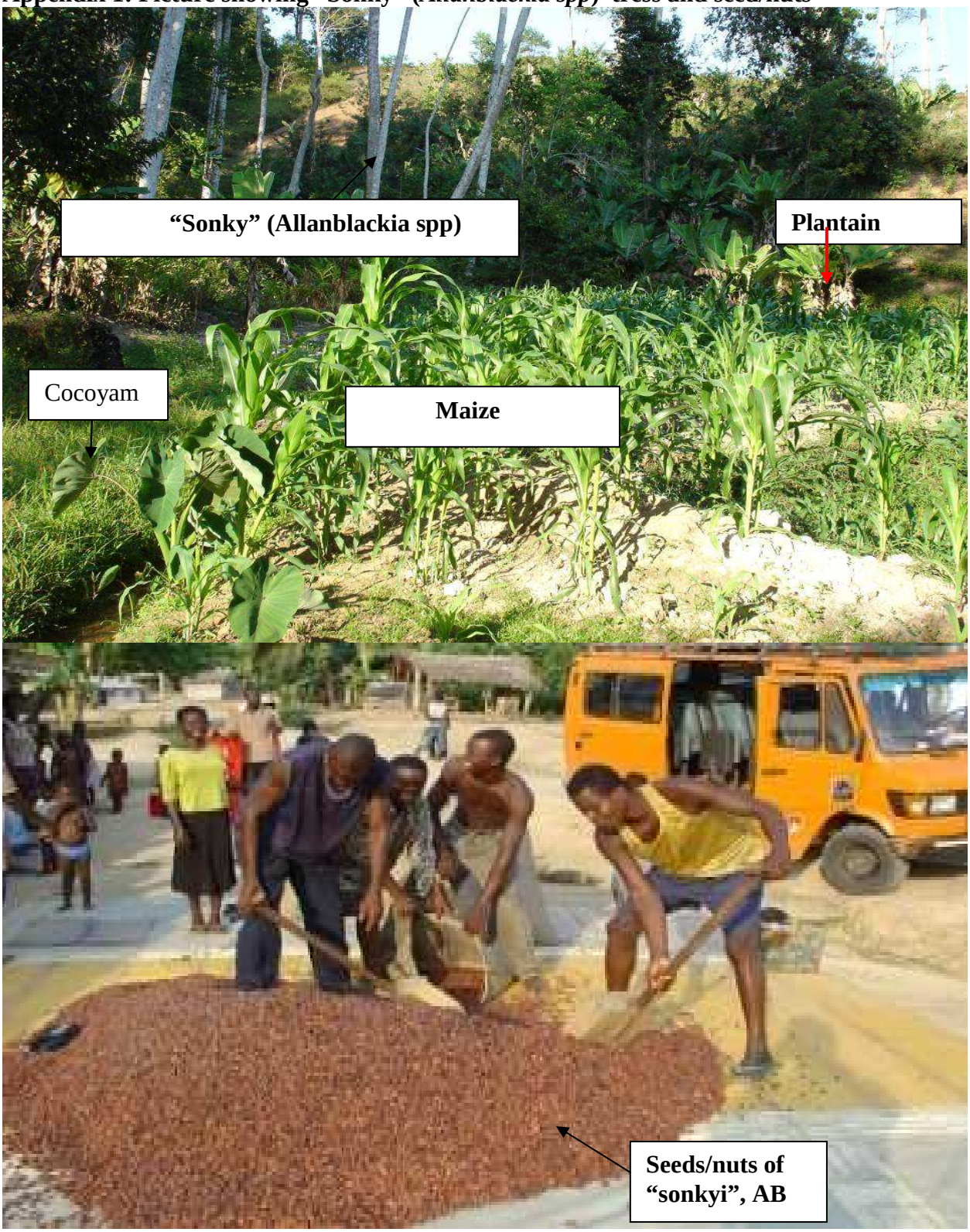
Republic of Ghana (2006). Growth and poverty reduction strategy (GPRS II). Volume 1, Policy framework. National Development Planning Commision. Accra.

Rogers, E.M. (1995). Diffision of innovation. The Free Press, New York.Ruttan, V.W. and Y. Hayami (1995). "Induced innovation model of agricultural development ". In: G.K. Eicher and J.M. Staatz(eds.), Agricultural Development in the Third World. John Hopkins University Press, Baltimore and London.

Ruttan, V. W. and Y. Hayami (1995). "Induced innovation model of Agricultural Development". In: G. K Eicher and J. M. Staatz (eds.). Agricultural Development in the Third World. John Hopkins University Press, Baltimore and London

Simons (2006)

Tissari, J and E. Y Danso (2007) Allanblackia: standard setting and sustainable supply chain management: A mid term evaluation final report.

Tietenberg, Tom. 1994. Environmental Economics and policy. HapperCollins College

Appendix 1: Picture showing "Sonky" (*Allanblackia spp*) tress and seed/nuts