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Constructing a Multinationals' Inclusive Sourcing Indicator for Impacting Farmer Business Models: Application in Cocoa Cases

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ABSTRACT

Cocoa multinationals have committed themselves to source and use close to 100 percent sustainable certified cocoa beans, aiming to improve farmers' livelihoods. As their current sourcing strategy is aimed mainly at environmental sustainability, they need a different one. This study seeks to amend this by providing an inclusive sourcing indicator, representing the integral costs of certified cocoa beans, to leverage values to impact farmers business model in high value-adding supply chains. Because this indicator is explorative indicator the applicability has been explored in four cases in Ghana and the Ivory Coast from the literature. This study's findings call for a review of conventional sourcing models and certification schemes to anticipate the mainstreaming of sustainable sourcing and the improvement of farmers' livelihoods.

Keywords: certification; cocoa; CSR; food multinationals; smallholders; supply chain management; sustainable sourcing.

1 Introduction

Food and Agribusiness multinational enterprises (MNEs) - such as Mars, Ferrero, Hershey, Nestlé-USA, Cargill, Mondelez International, and Unilever - dominate the world cocoa bean trade and grinding and the chocolate manufacturing industry, they have committed themselves to source/use close to 100% sustainable certified cocoa beans in the years to come. They have promised to do this in a way that improves the livelihoods or standard of living of small-scale cocoa farmers (smallholders) in developing economies. Together, these farmers produce more than 90% of the world's cocoa beans on around 5.5 million small-scale family-based farms, employing some 14 million rural workers. World cocoa production is highly concentrated in 6 countries: Ivory Coast; Ghana; Indonesia; Cameroon; Brazil; and Nigeria. Currently, only an estimated 22% of the world's cocoa bean production is certified (Pott et al. 2014). To meet the MNEs demand for certified cocoa, many more cocoa farmers will need to switch from regular to sustainable certified cocoa production. This shift poses particular challenges for small-scale farmers however, because they often lack the institutional, technological, infrastructural, and financial capabilities to effect the necessary changes themselves (e.g. Bush and Bain, 2004; London et al., 2010).

The present study explores how MNEs can source from small-scale cocoa farmers (smallholders) in cocoa-producing countries in ways that improve the livelihoods or standards of living of the smallholders. The approach to finding an answer to this inclusive sourcing challenge and the entry point in the global cocoa supply chain structure is the business model of cocoa bean producers.

The motivation for firms (MNEs) to care about improving small-scale farmers' livelihoods in developing and emerging economies is rooted in the debate on the role of business in society that started in the 1960s (Guinipero et al., 2013; Lee. 2008), i.e. the corporate social responsibility (CSR) of firms (Carroll, 1979). Focal firms were asked to consider the environmental and social problems throughout the entire supply chain and to simultaneously ensure performance on the triple bottom line (economic, social, and environmental) (Elkington, 1997). In the past decades, the CSR-strategy of firms shifted from expressing corporate philanthropy - and obtaining a 'social license to operate' (Gunningham et al., 2004; Howard-Grenville, 2005; Kolk and Tulder, 2010) - to a business case approach (Kurucz et al., 2008; Carroll and Shabana, 2010). Developing and emerging economies are considered to potentially provide big opportunities, both for value creation as consumers (Prahalad and Hart, 2002; Porter and Kramer, 2005) as well as for producers/suppliers (Karnani, 2007). The MNE strategy of tapping into the unexploited production potential of small-scale farmers within developing economies, in order to maintain a competitive edge in the growing global food markets, fits in with this approach.

The result of this transition in the corporate social responsibility of firms is that the classical CSR strategy (to get a social licence to operate) has been changed into a smallholder sourcing strategy with a business perspective (e.g. London et al., 2010; Vorley et al., 2009). A consequence of this business orientation is that the CSR strategy has to be integrated into the Supply Chain Management (SCM), with Procurement and Operations as core activities, to be able to include smallholders into high value-adding supply chains (e.g., Leire and Mont, 2010; Spence and Bourlakis, 2009; Fayet and Vermeulen, 2012). Historically, SCM has focused almost exclusively on economic value when evaluating and selecting suppliers (Monczka et al., 2009) and on the reduction of purchasing expenditure (Mentzer et al., 2001). This classical transaction performance orientation of SCM started to change around the year 2000, when scholars posited that there was value in considering environmental and social issues (e.g., Handfield et al., 2002, Srivastava, 2007). Along with the increasing footprint of MNEs in developing and emerging economies, there came increased critical attention to the role that social factors played in their global operations. Therefore, MNEs operating in emerging economies have started to emphasize CSR in their global business strategies and have become more sensitive and responsive to the problems and needs of the local business environments in which they operate (e.g., Reimann et al., 2012; Cruz and Pedrozzo, 2009).

Firms (MNEs) must take into account a larger part of their supply chain (more tiers) as one entire chain, because environmental impacts occur at all stages of the product's life cycle. Deeper and closer partnerships and the product life-cycle management have become key elements of stakeholder management in driving economic, environmental, and social performance of firms (Asif et al., 2013). It is considered a starting point in the debate on the inclusion of stakeholders and the integration of their demands for sustainable SCM (Seuring and Muller, 2008; Carter and Rogers, 2008). The conceptual and empirical linking of base-of-the-pyramid approaches (referring to business models which include the poorer segments of the global economy) to Procurement & Operation, has been deemed a gap in the literature on sustainable SCM (Seuring and Gold, 2013). The present study contributes to filling this gap through the development of an inclusive sourcing indicator aimed at both securing a sustainable supply as well as improving smallholders' livelihoods by F&A MNEs. This indicator is constructed by combining two

contrasting supply chain perspectives, top-down (from the buyer/focal firm perspective) and bottom-up (from the seller/farmer perspective). This two-way approach contrasts with conventional sourcing strategies that view the supply chain only one way to gauge its impact on smallholders' livelihoods.

The increasing pressures from society and globalization (deregulation) over the past decades are usually seen as the key drivers towards the implementation of voluntary private standards, codes of conducts, and certification arrangements/schemes (Gereffi, 2001; Ponte and Gibbon, 2005; Giovannici and Pont, 2005). Certification has appeared in almost every major industry, including the so-called third party sustainable certification schemes in the agro-food sector (e.g., Hatanaka et al., 2012; Raynolds et al., 2007; Geibler, 2013).

As the marketing of sustainable certified products is done through the championing of environmental and social issues that producers in developing economies have to facilitate, questions have been raised about the effectiveness of certification schemes. That is why many studies have focused on the impact of certification on the livelihoods of farmers growing commodities, mostly coffee (e.g., Blackman and Rivera, 2011; Rueda and Lambim, 2013; Ruben and Fort, 2011; Ruben and Zuniga, 2011, Dragusanu et al., 2014; Kilian et al., 2005; Nelson et al., 2013; KPMG, 2013; Ingram et al., 2014; Beuchelt and Zeller, 2011). Most impact-studies didn't assess the profitability of cocoa bean production by calculating the total cost/revenue per unit based on total costs (the sum of total variable and fixed costs) in accordance with farm economics theory (Kay et al., 2016; FAO, 2016). The basic assumption of this approach is that farmers should make a profit in order to be able to improve their standards of living. Therefore, it was amazing to find that almost all certification impact-studies on coffee, cocoa, and bananas only included total variable costs (labour and material costs) in their impact assessment. Moreover, the progress in reducing child-labour and introducing decent working conditions for hired workers in cocoa farming - which are related to the social performance indicator of Elkington's (1997) triple bottom line - were also not assessed. Other studies however reported that these social issues are on the whole far from solved (Barrientos and Smith, 2007; ILRF, 2014, Baah, 2010; Tulane University, 2015). The costs of these social issues in cocoa bean production therefore need to be estimated and included in the total cost of cocoa production. The question arises: "How, from a business perspective, can MNEs source sustainable certified cocoa beans from small-scale farmers in developing countries – with an eye to improving said farmers' livelihoods - while also taking socioeconomic issues into account?"

To answer this question, the present study aimed at constructing a theoretically based inclusive sourcing indicator that represents the integral costs of cocoa bean production. This indicator consists of the following elements: 1) the total variable and fixed costs of cocoa bean production; 2) the costs of not using child labour and hired labour earning a minimum wage; and 3) a residual return for the farmer/owner. The basic assumption being that the inclusive sourcing indicator should at least be covered by farm revenues (i.e. farm gate prices), generating enough profit to secure the farm's continuity. Because the developed inclusive sourcing indicator is conceptual and explorative of nature, the applicability of the indicator in real cocoa case studies is explored. Our research aim was not to validate the inclusive indicator nor to calculate the (absolute) integral costs price of certified cocoa beans in Ghana and the Ivory Coast. This paper will proceed as follows. The next section will explain the economy of certified cocoa bean production and which costs are related to it. This is followed by the construction of the total cost structure for certified cocoa bean production, based on a literature review. Section 4 explains how the inclusive sourcing indicator for the improvement of farmers' livelihoods is constructed. This is then applied to four cases, two in Ghana and two in the Ivory Coast (Section 5), and finally there are a discussion and conclusions in Section 6.

2 Cost dimensions related to certified cocoa production

2.1 The economic nature of a cocoa farm

To determine the costs and returns of certified cocoa bean production it must be considered that a cocoa farm/orchard/plantation is a fixed asset investment (capital good) that generates variable cash flows over multiple time periods. As capital goods are not entirely consumed over one production year, it is necessary to allocate the costs of capital goods to the production years for which they provide their services (FAO, 2016; Kay et al., 2016). Short term profitability (the economic profit) can be calculated by the breakeven analysis (the ratio total costs-total revenues), while the concepts of Net Present Value and Cost-Benefit analysis (Breadley et al., 2011) can be applied to profitability (the internal rate of returns) of long term investments in cocoa farms. A break-even analysis shows what farm-gate price - given the project yield - would be required just to cover the total of the variable and fixed costs, which is a short-

term survival tactic. Although this theoretical concept of economic profit is correct, an economic profit of 1 -which is the bare minimum for staying in business - is not sufficient for a small-scale cocoa farm's long term continuity (Fleming et al., 2009; Kay et al., 2016). Therefore, a margin on top of a breakeven (residual return to the farmer/owner or management investment income) is needed to absorb long term risks in price and yield fluctuations. From a business perspective, a mean residual return for the farmer/owner over the years is therefore considered to be critical to a cocoa farm's continuity. The initial farmer response to farm-gate prices being lower than the total costs may not be to stop production however, cocoa being a permanent crop with an economic life cycle of 20-25 years. They will first exploit the labour force (e.g., through low wages, excessive hours, and use of forced labour) or cut down on environmental management (Blowfield, 2003). In turn, this behaviour will harm the reputation of MNEs seeking to take responsibility for their supply chains. This is why a residual return for the farmer/owner has been included in the inclusive smallholder sourcing indicator we have developed.

2.2 The on-farm costs of cocoa bean production

Cocoa production on a farm consists of the following stages: growing; harvesting; fermenting and drying; packaging; and delivery to the first buyer (Afoaka, 2014; International Cocoa Organization, www.icco.org). Cocoa pods ripen at different rates, so harvest is done mainly by hand rather than by the use of machinery. The harvesting of cocoa pods (fruits) involves the removal of pods from the trees and the extraction of the beans and pulp from the pod; the beans are then separated by hand and the placenta is removed. This is followed by a process whereby the beans are fermented, which leads to the formation of constituents or flavour precursors, and dried in the sun. The dried beans are then packed up in bags and transported to the first buyer.

For the purpose of the present study, literature was sought on the total costs of on-farm production. Only one study - which deals with the economy of cocoa production in Hawaii (Fleming et al. 2009) - was found to provide a total cost (variable and fixed costs) price calculation of cocoa wet bean production. The costs of fermentation and drying were however not included in the calculation because these Hawaiian farmers deliver their wet beans directly to the processor. This total cost structure has been used in the present study as best-example for constructing the cocoa total cost structure (see Section 3), and for estimating the fixed costs of cocoa bean production in Ghana and the Ivory Coast (see Section 4).

2.3 The costs of cocoa certification

To produce sustainable certified cocoa, a farmer must be certified by one of the standard setting organizations, of which Fairtrade Labeling Organizations International (FLO), Rainforest Alliance (RA), UTZ certified (UTZ), and Organic are the largest. Each has its own distinct background (see Annex 1), the FLO centres around supporting small-scale producers, RA and Organic focus on the protection of ecosystems and biodiversity, and UTZ takes the market-based mainstreaming of sustainability principles as a starting point. Certification organizations set protocols for environmental and social issues, advise/guide farmers on how to implement sustainable agricultural practices, and take care of auditing and third party verification. The structure and objectives for achieving sustainable certified production and the costs vary among the schemes (see Table 1).

When adopting sustainable farm practices, in the initial period, the yields per unit and the costs of cocoa bean production are not optimal because the farmer is still going through a learning process. As the whole process of certification can take up to five years, covering the initial costs of implementing certification schemes is therefore critical when investing in certified farming. In practice, initial investment costs were often covered by grants from donors and private foundations (Kuit and Waards 2014). This indicates that small-scale cocoa farmers might need public project funding to accelerate the switch from regular to certified production, because it can take up to five years before a farmer gets fully certified. The risk for farmers is that they remain dependent on grants to cover the costs of certification. The certification costs on farm level are: an Internal Control System; training; audit; labour; certification investment; and fees paid to the scheme owner (KPMG 2012). Certification costs are a fixed cost dimension of cocoa bean production.

Table **1**.

Certification structures of the largest cocoa certification schemes in Ghana**.**

UTZ	Rain Forest	Fairetrade
1.Traceability, Product Identification and Separation 2. Management System, Record Keeping and Self-Inspection 3. Varieties and Rootstocks 4. Soil Management 5. Fertilizer Use 6. Irrigation 7. Crop Protection Products 8. Harvesting 9. Post-Harvest Product Handling 10. Worker Health, Safety and Welfare 11. Environment	1. Social and environmental management system 2. Ecosystem conservation 3. Wildlife protection 4. Water conservation 5. Fair treatment and good working conditions for employees 6. Occupational health and safety 7. Community relations 8. Integrated crop management 9. Soil management and conservation 10. Integrated waste management	**1 Social Development** 1.1 Fairtrade adds Development Potential 1.2 Members are Small Producers 1.3 Democracy, Participation and Transparency 1.4 Non-Discrimination **2 Economic Development** 2.1 Fairtrade Premium 2.2 Export Ability 2.3 Economic Strengthening of the Organization **3 Environmental Development** 3.1 Impact Assessment, Planning and Monitoring 3.2 Agrochemicals 3.3 Waste 3.4 Soil and Water 3.5 Fire 3.6 Genetically Modified Organisms (GMO) **4 Standards on Labor Conditions** 4.1 Forced Labor and Child Labor 4.2 Freedom of Association & Collective Bargaining 4.3 Conditions of Employment 4.4 Occupational Health and Safety

Source: Hatloy et al. 2012

2.4 Impact of the marketing system on the costs and revenues of cocoa beans in Ghana and the Ivory Coast.

Cocoa farmers in Ghana and the Ivory Coast face many challenges when navigating a complex industry, especially if they are not organized in producer-organizations/cooperatives as is the case in the Ivory Coast. While each country has its own supply chain (see Figure 1), smallholders have to deal with issues relating to government regulations and institutional infrastructures, affecting the costs and revenues of production.

In the Ivory Coast, the majority of cocoa farmers do not participate in cooperatives and instead individually sell their cocoa beans to commission agents, called *pisteurs*. They are contracted seasonally by *traitants* or registered cocoa trading companies; traitants are licensed by the government to trade cocoa. Pisteurs as well as traitants are able to offer farmers immediate cash payments, because they are financed by foreign-owned exporters who are not allowed to purchase beans directly from farmers (Healy et al. 2014). Producer prices for each season are set by a multi-stakeholder platform (CCC) that sells the future production of cocoa traders during auctions that take place before the harvest. In the Ivory Coast, farmers sell 80-85 percent of the cocoa beans they produce to pisteurs, while the remaining cocoa (15-20 percent) is sold through their cooperatives.

The cocoa market In Ghana is fully regulated by the government through the state-run cocoa marketing board (COCOBOD), which completely controls the export, marketing, and purchasing of cocoa beans. The price for cocoa paid to farmers is decided on by a multi-stakeholder committee (PPRC) that uses a percentage (70%) of the net Free On Board (FOB) price, which is the price of cocoa beans at the port of embarking in Ghana. Each season, COCOBOD authorizes a number of government-licensed organizations - called Licensed Buying Companies (LBCs') - to purchase cocoa beans that they are then required to sell to COCOBOD. Therefore, LBCs hire sourcing agents - called Purchasing Clerks - to purchase cocoa from farmers or cooperatives and deliver it at LBC warehouses, where it is graded and sealed by the state-owned Quality Control Division of the COCOBOD. COCOBOD provides a number of goods and services to cocoa farmers, such as subsidized fertilizer, mass spraying of pesticides, hybrid seedlings, and funding for farmers' houses and roads. The aim is to address issues such as low productivity and aging farmers and trees (e.g., Camargo and Nantumbo 2016). In Ghana, almost all cocoa beans are delivered to the LBCs; only a small number are sold to unorganized middlemen (Healey et al. 2014).

The extended local supply chain structure (see Figure 1) makes it difficult for MNEs to impact directly on farmers' business models in order to assure improvement of their livelihoods through sourcing. Therefore, MNEs need a different sourcing strategy.

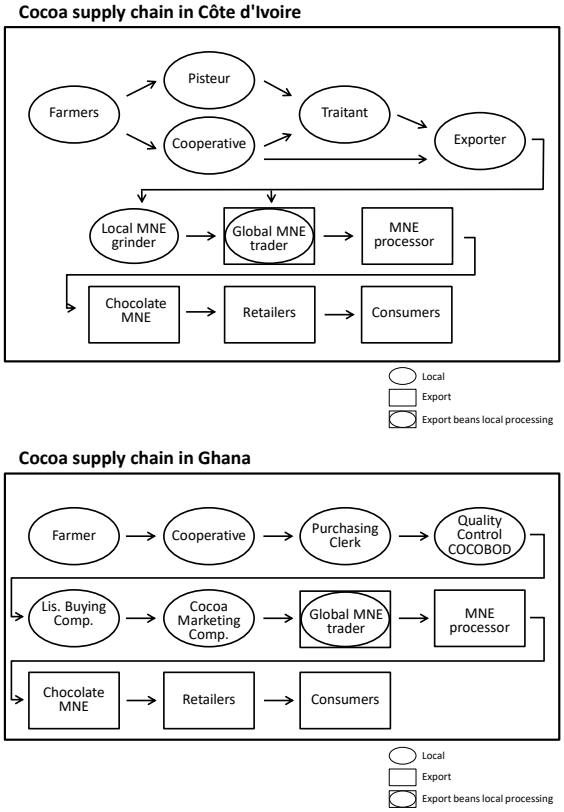

Figure 1. Cocoa supply chain in Ivory Coast and Ghana

3 Construction of total costs structure for certified cocoa bean production

Materials and methods

There were three steps involved in the construction of the total costs structure for certified cocoa bean production: First, the different phases of on-farm cocoa bean production: growing; harvesting; fermenting and drying; packaging; and delivering to the first buyer, have been studied in the literature (e.g., Afoakwa 2014, www.icco.org/about-cocoa/growing). The aim was to understand the consistency of the production processes and related costs. Second, a general total cost structure of crop production has been defined using the cost dimensions of crop production of the FAO (2016 pp. 14), combined with the Enterprise Budget for crop production from Kay et al. (2016 pp. 180). The aim is to understand how the costs of crop production can be portioned into components for cost calculations. Third, this total cost structure for crop production was then matched to the total cost structure of cocoa bean production by Fleming et al. (2009).

The total cost structure of crop production

The result of the construction of the general total cost structure of crop production is shown in Table 2. Total costs are defined as the sum of the total variable (operating costs) and the total fixed costs (ownership costs). Variable costs are all costs directly associated with: growing; harvesting (including pre-processing); packaging; storage; and delivering to the buyer. Variable costs vary with the quantities produced, while fixed costs are independent of the quantities produced, like the costs of buildings, machines, and the purchase of land. In both categories of production costs, there are those paid for by the farmer in cash or those that are unpaid (at least, not in cash) such as family work. Fixed costs are primarily annualized costs, consisting of capital costs, farm overhead costs, and land charges.

They mainly involve production resources: land; management; and the capital investment required (primarily for orchard establishment).

Table 2.
Total costs of crop production = Variable + Fiexed costs

Table 2: Total costs of crop production = Variable + Fixed costs	
Variable costs	**Fixed costs**
Cash costs • Purchased seed, fertilizers, pesticides. • Paid (hired) labour • Custom services (machinery, etc.) • Tool and materials • Fuels and water (iirigation) • Interest (loans and credits) **Non-Cash costs** • Unpaid family labour • Farm-produced inputs • Owned machinery	**Capital costs** • Depreciation costs and opportunity costs of capital on owned machinery, buildings and farm equipment **Farm overhead costs** • Unallocated fixed costs • Farm – level taxes, permits, licenses, etc. **Land costs** • Land rents and imputed rents, land related taxes
Total variable costs	**Total fixed costs**

The total cost structure of cocoa bean production

The results of constructing a template for the total costs of cocoa production are shown in Table 3. That is to say, the cost structure for crop production (Table 2) has been matched to the total cost structure consisting of variable and fixed cost dimensions of Fleming et al. (2009) (see Annex 2). In contrast to the cost structure of crop production, it has segmented variable costs of production, harvest expenditures that consist of labour and material costs, and a list of fixed (or ownership) costs of cocoa bean production. These cocoa cost dimensions were matched with the cost dimensions of crop production. Costs related to certification were not included in the calculations of the FAO (2016) and Kay et al. (2016). The certification costs from KPMG (2012) have been included as (paid) fixed costs, as the present study relates to certified cocoa bean production.

Table 3.
The standard total cost structure of certified cocoa bean production

Variable or operational costs.		**Fixed costs or ownerships costs.**
1.Labour costs related to source in: - own family (unpaid) - hired (paid)	2 Material costs: - fungicides - pesticides - fertilizer - herbicides - bags and ropes - tools - fuel, electricity - rentals: machines and equipment - irrigation, water - interest (operating expenses)	3. Land charge 4. Costs of certification: - Internal control system - training and labour costs - certification specific investments - audit costs - fees paid to scheme owner
1.Labour cost related to on-farm activities: - weeding - pruning - crop protection - nursing seedlings - replacing trees - harvesting - fermenting and drying		5. Costs of own capital: - depreciation: buildings, machinery, equipment, and annual replacement rate of trees - property taxes, insurance expenses - farm management overhead costs - opportunity costs of own capital
Total labour costs (1)	*Total material costs (2)*	*Total fixed cost (sum 3 through 5)*

Explanation of the cost dimensions of the total cost structure of cocoa bean production (Table 3):

1. Labour costs: these costs can be related either to the source or to the activities and are the biggest cost items of the total production costs of dry fermented cocoa beans. Depending on the wage rate used, they are estimated to cover more than 70 percent of the total cost of cocoa beans (e.g. Gockowski, 2013;

KPMG, 2012). The largest part of the total labour is done by the farmer and his/her family. The rest is done by hired labour, mainly during harvesting and processing; hired labour is paid in cash or in kind. No representative information on the division between own and hired labour in cocoa-farming could be found.

2. Material costs: material costs cover the different types of materials needed for the growing of cocoa, such as fertilizer and pesticides. The costs of pesticides and fungicides are the highest input costs, because diseases and pests pose the biggest threat to cocoa farming, before market risks like the volatility of prices and exchange rates (World Bank, 2011).

3. Land rent: land can be owned by the farmer or rented from others under a wide range of contractual arrangements (e.g., rents) or through arrangements which involve payment in kind (e.g., share cropping). The costs of owned land are the costs associated with the use of the land itself by the farmer, i.e. the calculated foregone revenues to the operator-owner. Unlike capital inputs, such as farm buildings and machineries - which generally wear out and therefore have a limited service life - the service provided by land can last indefinitely (FAO, 2016). Other cost items related to owing land are property taxes, water rights, and water management.

4. Costs of own capital: first of these are costs associated with the consumption related to own capital assets that are not used during one production period, such as buildings, machinery, and equipment. Livestock used for breeding or milk production and permanent crops such as cocoa, coffee, and oil palm are also considered to be capital goods. As such it is necessary to allocate the costs of the capital invested in cocoa plantation to the production years for which they provide this service. When a cocoa farm is to be operated in a steady-state or equilibrium characterized by a fixed asset base, the capital costs can be calculated by a constant replacement rate of trees as a percentage of the total trees per hectare per year. Second are the costs of own capital that are the opportunity costs of the owner's investment. These represent the expected return on the capital invested in farm operation, had it been invested in the next best alternative. These costs represent the expected returns (as a management and investment income for management and capital) on the own capital (FAO, 2016; Fleming et al., 2009).

4 Construction of the inclusive sourcing indicator for improving farmers' livelihoods

4.1 The dimensions of the inclusive sourcing indicator

The aim of the present study is to construct a theoretically based sourcing indicator consisting of all the costs of cocoa bean production for improving farmers' livelihoods as an answer to the inclusive sourcing commitment of MNEs. Firstly therefore, the general total cost structure of permanent crop production has been constructed on the basis of the farm economics theory (table 2). This total cost structure has been transformed into a standard total cost structure for cocoa production (table 3). It was also argued that the socioeconomic costs of ending child labour and improving the working conditions of hired labour that do not comply with international labour standards (Chapter 1), need to be included in the total cost of sustainable certified cocoa production in order to meet the triple bottom line approach of sustainability.

The final result of the exploration of these production costs is the inclusive sourcing indicator, defined as of the sum of the total variable and fixed cost + the costs of not using child labour + the cost of paying hired labour minimum wages that are in line with intentional labour standards + a residual return to the farmers, representing the integral cost of cocoa bean production (see Table 4). This sourcing indicator should be covered by farm revenues (farm gate price) with an eye to improving his/her livelihood/standard of living.

In Section 4.2 and 4.3 the impact of these two cost dimensions on the total costs of cocoa production has been estimated on the basis of an example using data from Ghana.

Table 4.
The Inclusive Sourcing Indicator for improving smallholders' livelihoods

The dimensions of the inclusive sourcing indicator	
Cost dimensions	**Specification**
1. The variable and fixed costs	- Variable costs: labour costs (paid and unpaid) + material costs - Fixed Costs: land charge + costs of certification + costs of own capital
2. Costs of not using child labour	Total working days (8 hours per working day) X minimum wage per hour in accordance with international standards
3. Costs of hired labour in accordance with international labour standards	Total workings day X (minimum wage in accordance with international standards – paid wages)
4. Residual return for the farmer/owner	Profit margin.
The integral costs = sum of cost dimensions 1 though 4	

4.2 Estimation of the costs of not using child labour in cocoa bean production

Cocoa growing households include children - defined as human beings between 5-17 years old - working on average for more than 80 percent in harvesting and post-harvest activities on the cocoa farm (Tulane University 2015). Involvement of children in farm maintenance, harvesting, and post-harvesting activities was determined to be 14 percent of the total labour required on a cocoa farm (Ministry of Man Power, Youth and Employment from Ghana, 2007; Baah, 2010). The total labour needed for activities which were previously carried out by children is calculated at 65 eight-hour working days per hectare. Children's participate in: 1) farm maintenance (most in weeding (22%), carrying water for spraying (10.5%), 2) harvesting (33,4%), and 3) fermenting (16.8) wet cocoa beans (Tulane University, 2015, p. 58 Table 21.b). In the current situation children are used instead of hired labourers for these activities, because they are also 'cheaper'(no out of pocket expenses) to the farmer. Accordingly, the amount of (unpaid) child labour per hectare is estimated to be 9.1 working days per hectare. Based on a minimum wage of US$2 per eight-hour working day (UN), the impact of child labour on the total costs is US$18.20 per hectare. This is US$0.05 per kg on the basis of the yield (403 kg per hectare), or 8 percent of the total operation cost of US$0.62 (calculation KPMG (2012). The costs of not using child labour by hired labour are included in the inclusive smallholder sourcing indicator. The aim is to enhance the transition to cocoa production free from child labour.

4.3 Estimation of the costs of paying standard minimum wage to hired workers

Cocoa production, particularly in small-scale farming systems, is highly labour intensive, rather than capital intensive. Farmers use a combination of family, hired, and communal labour in cocoa production. The main source is family labour, which fulfils 60 percent of the total labour requirements - child labour included - while hired labour accounts for 27.6 percent in Ghana (Ministry of Man Power, Youth and Employment from Ghana, 2007; Baah, 2010). Based on a total labour requirement per hectare, including (re)planting activities of 70 working days, the total hired labour in cocoa production is 19 eight-hour working days per hectare. It was reported that the hired workers, of which many migrated from neighbouring countries - such as Mali and Burkina Faso in the case of Ghana - are the most marginalized actors in the cocoa supply chain, receiving wages far below the minimum rate set by the government (e.g., ILRF, 2014). The consideration being that these workers are even more impoverished than the cocoa farmers that employ them, since small-scale farmers – who draw poverty-level incomes themselves – earn too little to pay their hired workers more. According to the Cocoa Barometer (2015) a cocoa farmer's earnings fall below the UN's absolute poverty line of US$1.25 a day, which is equal to the minimum wage (2013/2014) set by the Ghanaian government. When assuming that hired workers should earn the UN poverty line of US$2.00 per eight-hour working day, the costs of a better wage for hired workers amount to US$14,25 (19 days x US$0.75) per hectare. This comes to US$0.035 per kg (yield 403 kg per hectare, see Table 1) or 13.5 percent of the total variable costs. The aim is to include payment of minimum wages to hired labour in the inclusive sourcing indicator to help small-scale cocoa farmers comply with international labour standards.

5 Application of the standard total cost structure of cocoa bean production and the inclusive sourcing indicator in four cases

5.1 Case selection

The following domains in the empirical literature were explored to find relevant 'test'-cases: 1) the cost price of cocoa bean production; 2) impact studies of certification on cocoa farmers' livelihoods; and 3) a cost-benefit analysis of cocoa projects. This resulted in two studies found in the literature that concluded that there is a lack of (accurate) information and transparency on the cost items of cocoa bean production (KPMG, 2012; Kuit and Waarts, 2014). Moreover, the cost calculations in the studies were based on assumptions, such as volumes produced per farm or price premiums received by farmers, which made drawing conclusions about the profitability of cocoa production - when compared to each other -difficult.

Three studies could be selected, providing four cases in total, two in Ghana and two in the Ivory Coast:

1. Impact studies on certification schemes and their effect on farmers' livelihoods:

-. Ingram et al. (2014): This is an impact study of UTZ certification of cocoa in the Ivory Coast. It is based on a quantitative and qualitative interview-based assessment among 780 farmers from a representative sample, supplemented by in-depth interviews with cooperative managers, village chiefs, groups of villagers, and support organizations to obtain more qualitative information. Cost data were obtained from 720 farmers participating in the UTZ program. In the present study, the data on the labour and material costs and the average yield of certified beans have been used.

-. KPMG (2012): One in Ghana and one in the Ivory Coast.

This study focuses on the costs, advantages, and disadvantages of three certification schemes (Fairtrade, UTZ Certified and Rain Forest Alliance) in Ghana and the Ivory Coast. As such, this study provided two cases for the assessment. The UTZ certification was used instead of the Fairtrade and RA certifications, because the other impact study also deals with UTZ certification. The KPMG study combined a comprehensive literature study with semi-structured interviews with NGOs, certification organizations, and other interviewees. This study data provided detailed data on cost certification and the impact of the marketing system on the material costs of cocoa production.

2. Gockowski et al. (2013). This study used the discounted cash flow analysis to estimate the Net Present Value (NPV) of operation costs and revenues and the internal rate of return (IRR) to the establishment of a new cocoa plantation in Ghana. The economic lifecycle was set to 21 years. This study is based on primary data on long-run cocoa trails, supplemented with secondary sources regarding input and output prices, labour estimates, and expert interviews. For the purpose of this study the averages of the labour and material costs over the 21-year period were used, representing the average variable costs of cocoa bean production. Other cocoa cost benefit analysis studies that were found, such as from Obiri et al. (2007) in Ghana and Nkang et al. (2007) in Nigeria, were excluded from the present study because the cost data were incomplete and not transparent.

3. Only one study on the economics of cocoa production in Hawaii (Fleming et al., 2009) was found which provided a detailed integral cost price structure of wet cocoa beans in Hawaii according the farm economics theory (see Annex 1). Because no integral cost price calculation of cocoa bean production from a West-African cocoa producing country could be found in the literature, the ratio fixed-total cost of cocoa bean production was used to estimate the fixed cost of cocoa bean production in Ghana and the Ivory Coast.

5.2 Results of the application of the standard total costs of cocoa beans to the cases

The research process started with collecting and addressing the cost dimensions of cocoa bean production from the four cases according to the developed standard total cost structure of cocoa bean production (see Table 3). The aim was to compare the cost structure and dimensions of cocoa bean production to draw conclusions regarding the differences in cost dimensions per case, but not to compare costs between cases. This is because the cases differed too much from each other to be able to draw conclusions.

To calculate the total costs per kg in US$ of cocoa bean production per case in both countries, the costs per hectare were converted to an average yield in kg per hectare and costs per ton were converted to kg. Costs expressed in local currency, Ghanaian Cedis (GHS) and Ivorian francs (CFA), were converted to US$ on the basis of the average exchange rate of the US$ from the first half of 2013 (because the cases were from that period 2012-2013, i.e. avoiding impact of adjustments of exchange rates of the countries). The result is shown in Table 5.

Table 5.

The costs of certified cocoa bean production in Ghana and the Ivory Coast based upon cost data from the cases

Costs of sustainable certified cocoa bean production based on costs data from cases				
Standard cost dimensions	**Ivory Coast (Ingram et al. 2014)** In CFA per hectare	**Ivory Coast (KPMG 2012)** In US$ per ton	**Ghana (Gockowski et al. 2013)** In GHS per hectare	**Ghana (KPMG 2012)** In US$ per ton
I. Variable costs				
1. Labour costs	CFA118,123	Not specified (n.s.)	GHS1,183	n.s.
2. Input costs	CFA39,152	n.s.	GHS187	n.s.
Total variable costs	CFA157,275 Or US$235.91	US$455	GHS1,370 or US$328,80	US$405.5
II. Fixed costs				
1. Certification costs	US$20.27*	US$43.40	US$84.74*	US$101
2. Land charge**	Not included (n.i)	n.i.	n.i	n.i.
3. Costs of own capital**	n.i.	n.i.	n.i.	n.i.
Total fixed costs	Not complete (n.c.)	n.c	n.c.	n.c.
III. Total variable costs and certification costs	US$256.18 per hectare	US$498.40 per ton	US$413.54 per hectare	US$506.5 per ton
Yield (kg per hectare)	467	565	839 (high yield cocoa hybrid variety)-	403
IV. Total variable costs and certification costs per kg. Currency rate (average first half from 2013): CFA1 = USD0.0015 GSH1 = USD0.24	US$0.55	US$0.50	US$0.49	US$0.51

* In these cases, certification costs were not calculated. Therefore, we applied (and converted into kg) the certification costs from the KPMG cases. For example for Ivory Coast: 467 (yield kg per hectare) x US$0.0434 (per kg) = US$ 20.27 per hectare. ** These fixed cost dimensions were not included in the costs of environmental certified cocoa bean production in the four cases.

5.3 Results of the application of the sourcing indicator (the integral costs) to the cases

To calculate the integral costs of cocoa bean production - consisting of the total variable and fixed costs and the costs of not using child labour and paying minimum wage to hired labour from the four cases - we first estimated the total fixed costs of the four cases, because these were missing (see Table 4). Therefore, we used the model integral costs calculation from Fleming et al 2009 (see Annex 2) on the cocoa bean production in Hawaii. This is because no standard integral cost price calculation of cocoa bean production in a West-African country could be found. However, cocoa farming in Hawaii differs greatly from that in West-African countries:

1) Labour costs in Hawaii are much higher than those in West Africa. Labour costs in Hawaii are about eight times higher than the minimum wages per eight-hour working day as set by the government of Ghana (US$ 12 vs. US$ 1.50 for 2014)). (retrieved from http://www.mywage.org/ghana/home/salary/-minimum-wages/minimum-wage-timeline). This implies that the share of labour costs in the variable costs from the West African cases (26,4%) are relatively lower than those from the Hawaiian case (76.8%).

2) Because disease and pest control are less relevant in the Hawaiian case, the share of material costs in the Hawaiian case is lower than those of the West African cases.

To estimate the fixed costs of cocoa bean production in Ghana and the Ivory Coast, the ratio of fixed-variable growing costs of the Hawaiian case was used. The harvesting costs, which are almost all labour

costs, were excluded for the estimation of the fixed cost of cocoa beans in Ghana and the Ivory Coast, because of the high labour costs in Hawaii as compared to said countries. The share of labour in the total variable costs in the Hawaii case drops from 76.8% to 54.6%. The consideration being that it makes the estimation more realistic for the use of the Hawaii cost price calculation to estimate the fixed costs of cocoa beans production of West African cases. This ratio was calculated at 16.25 percent (see Annex 2).

The results of the calculation of the integral costs of cocoa beans production of the four cases based on the inclusive sourcing indicator are presented in Table 5. When calculated with the aid of the inclusive sourcing indicator for improving farmers' livelihoods - which represents the integral costs of cocoa bean production in Ghana and the Ivory Coast - the total costs of cocoa production from the studies (see line III in Table 5) should be increased by: 16.25 percent for fixed costs; 8 percent for replacing child labour (paragraph 4.2); and 13.5 percent for paying minimum wages to hired labour (paragraph 4.3); totalling an increase of 40 percent. The required (long-term) residual income of the owner/farmer as a bottom line to ensure continuity of the cocoa farm as a 'going concern' is included as p.m.. In the Hawaii case the residual return for the owner/farmer was calculated at 23.3 percent of the total (integral) costs.

The results of these calculations are shown in Table 6. For example: fixed costs of cocoa beans in Ghana is: 0.1625 x US$0.55 (zee line IV Table 5) = US$0.09. For the calculation of child labour and hired labour see sub-Sections 4.2. and 4.3 respectively.

Table 6.

The integral costs of cocoa bean production including estimated fixed costs* and social sustainability costs, based on data from the cases in Ghana and the Ivory Coast per KG in US$ (2013 currency rates).

Calculation of the integral costs of cocoa bean production of cases in Ghana and the Ivory Coast				
In US$	**A. Ivory Coast (Ingram et al. 2014)**	**B. Ivory Coast (KPMG 2012)**	**A. Ghana (Gockowski et al. 2013)**	**B. Ghana (KPMG 2012)**
1. Total variable costs and certification costs per kg (see IV Table 4).	0.55	0.50	0.49	0.51
2. Fixed costs: 16.25%	0.09	0.08	0.08	0.08
3. Total variable and fixed costs (1+2)	0.64	0.58	0.57	0.59
4. Child labour costs: 8%	0.05	0.05	0.05	0.05
5. Hired labour costs: 13.5%	0.09	0.08	0.08	0.08
6.Residual returns	profit margin.	profit margin	profit margin	profit margin.
7. Integral costs (3 + 4+ 5 +6)	0.78	0.70	0.69	0.72

)*: including environmental sustainable costs (derived from KPMG 2012, see also Table 5)

6 Discussion and conclusions

Cocoa multinationals have committed themselves to source up to 100 percent sustainable certified cocoa so as to improve farmers' livelihoods in the years to come. The present study seeks to aid this by developing a sourcing indicator derived from the literature and consisting of the integral costs of sustainable certified cocoa bean production, including the costs for replacing child labour, paying minimum wages to hired labour, and a residual return to the owner/farmer. This inclusive sourcing indicator is considered to represent the integral costs of sustainable certified cocoa bean production and can be used to determine the improvement of farmers' livelihoods and standard of living from a sustainable business perspective. The basic consideration being that the integral costs are covered by farm returns, i.e. the breakeven price - the ratio of total costs (the indicator) to total revenue (the farm gate price) per unit– should at least be 1. Accordingly, it is recommended that, when doing studies on the impact of sourcing strategies on livelihood improvement of producers, it is best to include a break-even analysis based on a standard integral cost price calculation of production including the social and environmental sustainability costs. However, the present study clearly states that there are implications with achieving this goal in practice.

First, the problem being that MNEs traditionally source from large traders and exporters (acting as turn-key suppliers), who generally deliver commodities - like sustainable certified/labelled cocoa beans - to the specifications of the customer (MNEs). In addition, the extended local cocoa supply chain structure (see

Figure 1) makes a transfer of price benefits directly to cocoa farmers in developing countries a challenging task. Nevertheless, MNEs need to get closer to the producers/farmers, using their dominant position in cocoa global supply chains (Perez-Aleman and Sandilands, 2008; Alvarez et al., 2010; Gold et al., 2013; Sjauw-Koen-Fa et al., 2016), or using current market-based mechanisms based on certification schemes (Dragusanu et al. 2014) to make their inclusive commitment a reality. These sourcing challenges have not been studied extensively.

Second, some of the certification schemes such as Fairtrade pay premium for community development and capacity building programmes in the communities where the cocoa beans are sourced from. The question arise, are the costs of such programmes, which can also contribute to improvement in cocoa farmers' livelihoods, not relevant?

Most studies on the impact of certification of farmer livelihood concluded that sustainable certification schemes have contributed generally to smallholders' livelihoods (see Section 1 p. 5). However, the conclusions were often mixed (e.g. Raynolds et al., 2007; Hatloy et al., 2012; Nelson et al., 2013; Ton et al., 2016). Fairtrade (FT) has the strongest social justice standards, while other schemes are more focused on environmental/ecological and food safety standards. FT also differ from others because it set standards for traders (are FT certified). FT guaranteed price floor above market price with a social premium (for community development support, to be sold to a FT buyer, which is intended to cover the average costs of sustainable production and meet broadly determined living wage in the sector. A FT buyer agrees to pay certified producers at least the minimum price when the world market price is below this price. However, just producing and certifying a product does not guarantee that the FT buyers will purchase it as FT and provide the associated benefits and price. There are studies opposing that part of the produce has been bough as FT and the other part as conventional beans. As such, farmers needs to cover the certification costs over the total production. Moreover, in the period 1989-2014 the world market price were usually above FT minimum price (exceptions were late 1990s and early 2000s) (Dragusanu et al., 2014).

The developed inclusive sourcing indicator for impacting farmer business model differs from the FT pricing system, because it is based on the cost price calculation of crop production according the farm economics theory, while FT uses the market price as a floor. The assumption of our approach is that at least all costs of certified cocoa bean production should be covered in order to ensure farm continuity and to improve livelihood.

Third, the ultimate problem rests with the consumers found at the end of the cocoa value chain from bean to cup (see Figure 1). Consumers should be motivated to pay for the integral costs of cocoa beans. Studies have confirmed that, in general, only a quite limited percentage of consumers translate environmental and social concerns into buying behaviour (e.g., Kennedy et al., 2009; Young et al., 2009). Therefore, reducing the information asymmetry vis-á-vis consumers and signalling the positive ethical quality of cocoa products - such as the improvement of farmer's livelihoods - seem critical to gaining success. Other scholars have however argued that negative signalling of the low ethical quality of a product has a stronger effect on the adoption of ethical products (Van Dam and De Jonge, 2015). According to this view, the problem of consumer buying behaviour will be mitigated when MNEs' smallholder sourcing strategies for improving farmers' livelihoods based on integral price of cocoa beans are mainstreaming.

However, there are limitations to the calculation of integral costs of cocoa beans in Ghana and the Ivory Coast, because they are based on only two cases per country. Moreover, the integral costs structure used as a bench-mark is from Hawaii, but not from a West African case. Calculation of production costs per kg cocoa beans is dependent on many local and farming conditions, including: farmers' entrepreneurships; differences in approaches; and used indicators and scale (e.g., Tallontire et al., 2012; Kuit and Waards, 2014). Accordingly, we recommend further research, including more cases, in order to calculate the integral cost price of cocoa beans in West Africa. The critical question remaining is the outcome of the variable and fixed costs calculation, which depends on the quality/source of the collected cost data of cocoa bean production. The problem being that smallholders in developing economies are mostly unfamiliar with cost price calculation and bookkeeping (e.g., lack of year–to-year track records). Their lack of price and market information often puts them at the mercy of middlemen (London et al., 2010).

Another question for further research regards the implementation of the inclusive sourcing indicator with regard to the operationalization of the inclusive sourcing indicator throughout the entire cocoa supply chain as a norm for sustainable smallholder sourcing that should be monitored and reported on.

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Annex 1

Overview of main certification schemes in coffee sector

	Fairtrade	Organic	Rainforest Alliance	Utz Certified
Mission*	Ensure equitable trading arrangements for disadvantaged smallholders who are organized into co-operatives.	Create a verified agriculture system that produces food in harmony with nature, supports biodiversity and enhances soil health.	Integrate productive agriculture, biodiversity conservation and human development.	Implement a global decency standard for responsible coffee growing and sourcing.
History*	Began in 1970s in the Netherlands as Max Havelaar, now several national organizations under the umbrella of the Fairtrade Labelling Organisation (FLO). Coffee first labelled product in 1989.	Began in early 1970s as farming movement and developed into internationally recognized system.	Begun in 1992 by Rainforest Alliance and a coalition of Latin American NGOs. First coffee farm certification in 1996.	Founded in 1997 with criteria based on scientific fieldwork. Utz Kapeh Foundation started in 2002.
Commercial conditions**	Pre-financing and long-term relationship. Assurance of a Fairtrade premium, internalization of social and environmental costs. Contribution to balance demand and supply.	High assurance of demand, with a market price premium.	Good balance between production and demand. Price premium depends on market demand.	Strategic balance between supply and demand. Price premium depends on market demand.
Supply chain coverage and traceability**	Coverage focused at producers' level, trader standards applicable.	Separate criteria on processing and handling.	Coverage of standards focused at producers' level, transactions registered at electronic marketplace.	4 inspection levels (producer, certificate holder, nursery, storage); separate chain of custody code. High traceability, web based.
External control**	Certification centralized through FLO-Cert in Germany, based upon checklist of local inspectors.	Accreditation and certification, by private and governmental bodies.	Certification by Sustainable Agriculture Network (SAN) members.	Independent third-party control by approved bodies, local and international.
Multi-stakeholder participation**	Revision of governance structure, to balance stakeholder participation from producers' side. Difficult to enter for new producer groups.	Federation of 750 member organizations ranging from organic producers, retailers and NGOs to (large) companies with indirect influence on standards bodies.	Standards developed by environmental NGOs of the SAN network, together with local stakeholders and international experts.	Two-yearly evaluation of standards in multi-stakeholder consultation process. At local level there is a weak relationship with labour unions.
Consumer communication**	B2C concept with active communication.	B2C message by 95% organic.	2 types of B2C communication: (1) label 100% RA coffee; (2) label minimum 30–90% RA coffee with a seal indicating the exact percentage.	B2B communication. Assurance label used on pack when at least 90% is Utz certified.

Source: Kolk, A., (2013 pp. 328)

Annex 2

Integral costs structure of cocoa bean production in Hawaii (US$ per acre, excluding harvesting costs).

				Percentage of total costs
I Variable (growing) costs	*Materials*	*Labour*	*Machinery*	
1. Fertilization	1,064	532	200	
2. Irrigation (water)	490	399	0	
3. Pest and disease control*	0	0	0	
4. Weed control*	0	266	80	
5. Pruning	0	559	0	
6. Other costs	0	0	0	
Total	1,554	1,756	280	
I Total variable costs	3,590			83.75%
II. Fixed (ownership) costs				
1. Land charge	185			
2. Delivery to processor	0			
3. Risk management costs: insurances	196			
4. Management overhead: - office expense - professional service	 100 200			
5. Orchid establishment: - establishment cost - annual replacement rate	 1.40 14.00			
II. Total fixed costs	696.40			16.25%
III. Total cost of production: total variable and fixed costs	4,286.40			100%

*: Pests and disease control (including used of chemicals) may be necessary, especially for young trees, but it is not assumed to be an important factor in Hawaii by the authors

Source: Fleming et al. (2009)