Attiéké In Côte d'Ivoire

Bomoh Catherine EBAH DJEDJI, Centre National de Recherche Agronomique (CNRA), Abdjan, Côte d'Ivoire
Kouadio Christelle Marina KOUAKOU, CNRA, Abidjan, Côte d'Ivoire
Ernest DEPIEU, CNRA, Abidjan, Côte d'Ivoire
Alban Landry KANON, CNRA, Abidjan, Côte d'Ivoire

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1. FOOD SCIENCE – SOK REPORT

1.1. Template: Food science document + data review

Instruction: complete one template for all documents reviewed including as much information as possible. Add as many rows if necessary or move to Excel if easier.

Document Quote Journal

Citations	Country and region of focus
Aboua F. (1989). Simple Methods for Evaluating Attiéké Spoilage. *Food Chemistry*, **31**: 313-317.	Côte d'Ivoire
Aboua F. (1993). Some biochemical and microbiological changes during dehydrated attiéké storage. *Food Chemistry*, **47** : 395-397.	Côte d'Ivoire
Sahoré D.A. et Nemlin G.J. (2012). Changes in Biochemical Properties of Fresh Attiéké During Its Storage. *Food and Public Health*, **2**(4): 99-103.	Côte d'Ivoire (Abidjan)
Gnagne A.A.B.G., Koffi K.E., Assanvo B.J. et Soro S. (2016). Influences de la congélation et du séchage de l'*attiéké* sur ses caractéristiques physico-chimiques et organoleptiques. Int. J. Biol. Chem. Sci. **10** (2): 808-819.	Côte d'Ivoire (Adjamé-Bingerville)
Akely P.M.T., Azouma Y.O., Amani N.G. (2010). Mechanical pressing and semolina preparation from fermented cassava paste during ''attiéké" (yucca flour) processing. *Journal of Food Engineering*, **101**: 343-348.	Côte d'Ivoire
Akely P.M.T., Djina Y., Konan B.R., Irie K., Kouame L.P. et Amani N.G. (2016). Study of Varietal Influence Post Conservation on Biochemical and Sensory Qualities of Attiéké and Boiled Cassava (*Manihot esculenta* Crantz). *Sciences agronomiques*, **7:** 127-136.	Côte d'Ivoire (Abengourou)
Djeni N.T., N'Guessan K.F., Toka D.M., Kouame K.A., Dje K.M. (2011). Quality of attieke (a fermented cassava product) from the three main processing zones in Côte d'Ivoire. *Food Research International*, **44** : 410-416.	Côte d'Ivoire (Abidjan, Dabou, Jacqueville)
Coulin P., Farah Z., Assanvo J., Spillmann H., Puhan. Z. (2006). Characterisation of the microflora of attiéké, a fermented cassava product, during traditional small-scale preparation. *International Journal of Food Microbiology*, **106:** 131-136.	Côte d'Ivoire
Nimaga D., Tetchi F.A., Kakou C.A., Nindjin C. et Amani N.G. (2012). Influence of Traditional Inoculum and Fermentation Time on the Organoleptic Quality of "Attiéké". *Food and Nutrition Sciences*, **3**: 1335-1339.	Côte d'Ivoire
Assanvo J.B., Agbo G.N., Behi Y.E.N., Coulin P. et Farah Z. (2006). Microflora of traditional starter made from cassava for "*Attiéké*" production in Dabou (Côte d'Ivoire). *Food Control*, **17:** 37-41.	Côte d'Ivoire (Dabou)
Mégnanou M.R., Kouassi A.S.K, Koua Y.A.G., N'zué B, Tian-Bi D.R., Akpa E.E. et Niamké L.S. (2013). Valorization of six new yellow colored cassava (*Manihot esculenta* Crantz) flours from Côte d'Ivoire: a wide potential of utilization through their physicochemical and biochemical characteristics. *International Journal of Plant, Animal and Environmental Sciences*, **3** (3): 25-30.	Côte d'Ivoire
Krabi E.R., Assamoi A.A. et Ehon A.F. (2015). Production d'*attiéké* (couscous à base de manioc fermenté) dans la ville d'Abidjan. *European Scientific Journal*, **11** (15): 277-292.	Côte d'Ivoire (Abidjan)
Ebah-Djedji B.C., Sahoré D.A, N'Zué B. (2013). Sensory Factors of Some Cassava Traditional Dishes: Foufou, Placali, Attiéké and Boiled. *Journal of Pharmacy*, **3** (3): 59-65.	Côte d'Ivoire
Sotomey M., Ategbo E.-A.D., Mitchipke E.C., Gutierrez M.-L. et Nago M.C. (2001). Innovation et diffusion des produits alimentaires en Afrique: l'*attiéké*	Bénin

au Bénin. Alimentation, Savoir-faire et Innovation en Agroalimentaire en Afrique de l'Ouest. CIRAD 2001, 97 p.	
Ebah D.B.C. (2014). Caractérisation biochimique des racines tubéreuses de variétés améliorées de manioc (*Manihot esculenta* Crantz) et étude des propriétés fonctionnelles de leurs amidons : aptitude à la transformation. Thèse de doctorat, Université Nangui Abrogoua, Côte d'Ivoire, 161 p.	Côte d'Ivoire
Ebah-Djedji B.C., Dje K.M., N'Zue B., Zohouri G.P. et Amani N.G. (2012). Effect of Harvest Period on Starch Yield and Dry Matter Content from the Tuberous Roots of Improved Cassava (*Manihot esculenta* Crantz) Varieties. Pakistan Journal of Nutrition, **11** (5): 414-418.	Côte d'Ivoire

1.2. Document review

Note: always disaggregate data by gender and other factors of social difference if available

Source (first author, year)	Methodology	Raw material characteristics	Note any differences in the preferences for the characteristic by region, processing method, ethnicity, gender etc.	Food processing and preparation (disaggregated by gender and other factors of difference wherever possible, if recorded in document)	Characteristics of cassava and attiéké	Comment on your level of confidence in the paper
Aboua (1989)	Simple methods for assessing attiéké degradation - Fresh attiéké packed in plastic bags stored at room temperature for 4 days. - Optical density, viable microorganisms and pH were determined. - A quantity of attiéké served in cups coded to 10 experienced panellists sitting in individual booths. The panel rated attiéké for the flavor using a scale from 9 = fresh attiéké flavor ("excellent") to 1 = extreme flavor ("completely unacceptable"). The flavors of the samples to be tested compared with those of fresh samples obtained the same day and stored at 5 ° C. The panelists received the standard and two samples of each storage time.		A deterioration of attiéké, an increase in lactic acid bacteria load over time and an increase in pH over time was observed.			This document shows that the flavor and pH of attiéké is related to the activity of lactic acid bacteria.
Aboua (1993)	Some biochemical and microbiological changes during the storage of dehydrated attiéké - The shelf life and quality of dehydrated attiéké packed in polyethylene bags evaluated during storage at initial moisture contents of 10.5%, 18.3% and 22%.		The shelf life of attiéké stored at 10.5% humidity was longer than four weeks, compared with less than four weeks for a higher moisture content.			Moisture, starch, total sugar, reducing sugar and ash of dehydrated attiéké has stable and has an acceptable quality for at least four weeks.

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Sahoré and Nemlin (2012)	Change in biochemical properties of fresh attiéké during storage - Attiéké samples were stored at various temperatures: (30 ° C), (15 ° C), (6 ° C) and (-18 ° C) for 15 days to study changes in biochemical properties during storage time. - Specific biochemical parameters study: moisture, pH, ash, titratable acidity, total sugars, total carbohydrates and starch		At room temperature, the attiéké fermented rapidly after 3 to 4 days at 15 °C and at 6 °C the fermentation took place in the first 10 days. The biochemical properties of attiéké stored at -18 ° C in the freezer remains stable, except that the taste becomes bland.	The processing steps are: peeling, washing, cutting, grinding, adding water and ferment, pressing the fermented dough, semolina and granulating, drying and steaming.		The storage temperature influences the shelf life of attiéké. Negative temperatures extend the shelf life of fresh attiéké but have a negative effect on taste.

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Gnagne *et al*. (2016)	Influences of freezing and drying on physicochemical and organoleptic characteristics of attiéké - The pressing steps of cassava paste, granulating and cooking are carried out using mechanical equipment: hammer mill, centrifugal - Specific physicochemical parameters: dry matter, ash, hydrogen cyanide, pH and acidity - Sensory analysis: Triangular tests were performed with trained subjects, and untrained subjects performed hedonic tests. - Triangular test: panel composed of 12 tasters trained during 5 tasting sessions (one session corresponding to the tasting of a sample of attiéké each month). During each session, three samples of attiéké preserved was presented to the tasters: two were identical and the third was different. The three samples, coded using a three-digit number, presented simultaneously. The subject will have to identify the different sample. A sheet used for the triangular test submitted to each subject on which it informs the code of the different perceived sample. - The hedonic tests conducted with 50 untrained subjects (men and women) for five sessions, to determine the tasters' preference for three characteristics: taste, smell and color, using a scale from 1 to 9 points. The 50 tasters receive the three-attiéké samples (reconstituted frozen attiéké, reconstituted dried attiéké and fresh attiéké) randomly and consecutively during each tasting session. A session corresponds to a tasting of an attiéké sample taking each month. A three-digit number is used to code each samples.		Hedonic test results showed that reconstituted frozen attiéké is better appreciated than reconstituted dried attiéké.	Preparation of attiéké In the improved method of attieke preparation the pressing steps of cassava paste, granulating and cooking were carried out using mechanical equipment.	Physico-chemical characteristics of fresh attiéké pH is 4.4; dry matter 55.32%; titratable acidity 60 mg q/ 100g and hydrocyanic acid 3.03 ± 0.47 mg / 100g. Sensory characteristics Fresh attiéké is the most appreciated	The results obtained show that freezing is the preservation method that better preserves the physico-chemical and organoleptic characteristics of attiéké.

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Akely *et al*. **(2010)**	Mechanical pressing and preparation of semolina from fermented cassava paste during the production of attiéké - A pneumatic press was used for pressing the crushed cassava paste.			<u>Preparation of ferment</u> The roots peeled, immersed in water and boiled for 30 minutes. They were cooled, then tightly wrapped in a polypropylene bag and fermented more or less anaerobically for 36 hours at 30 ° C in a well-covered bowl with a lid. The fermented roots scraped from the surface and used as ferment afterwards. <u>Preparation of attiéké</u> The cassava roots peeled, cut into pieces and washed. The roots then crushed and fermented overnight at 30 ° C by adding 3 level of ferment: 8%, 10% and 12% of pre-fermented cassava roots. After 12 hours of fermentation, the pulp was pressed using a pneumatic press	Cassava paste fermented with 10-12% ferment between 12-24 h, wringed at about 50-52% moisture, and an axis inclined at 28-31° horizontally are mainly favorable to obtain high quality attiéké.	Granulating is an important step in the manufacturing process for obtaining high quality attiéké.

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Akely *et al*. (2016)	Study of Post-storage: Varietal Influence on the Biochemical and Sensory Qualities of Attiéké and Boiled Cassava - Descriptive test: panel of 12 people (including 6 girls and 6 boys) - Hedonic test: 60 candidates tested and classified the 4 types of Attieke obtained - Sensory attributes of boiled cassava: appearance (floury or translucent), color (white or yellow), texture (friable or hard), taste (bitter or sweet), chewability (easy or difficult) presence of fibers (few or many) - Sensory attributes of attiéké: appearance, color, presence of fibers, texture (adhesion), taste and chewability	Varieties studied: Bocou 1, Bocou 2, Bocou 3 and Yavo - The varieties of cassava harvested at 13 months.	- Boiled cassava of the Yavo variety is the most sensory appreciated compared to that of Bocou 1 variety. - Attiéké of the Bocou3 variety is the most appreciated compared to that of Yavo variety.	<u>Preparation of attiéké</u> Attieke was obtained according to the method described by Akely et al. (2008). 5 kg of cassava roots peeled, cut into pieces and washed. The chips crushed after addition of 10% of palm oil. The resulting cassava paste fermented followed by pressing. The cake obtained is crumbled, sieved and mechanically granuled. Afterwards, the product was partially dried and steamed at 100˚C to obtain attiéké.	<u>Characteristics of cassava</u> The Bocou2 variety has the highest protein content of 2.64% ± 0.01%, followed by Bocou 1, Bocou 3 and Yavo. ; Hydrocyanic acid of 8.21 ± 0.01 mg / 100 g and total carotenoids of 26.7 µg / 100 g. <u>Characteristics of Attiéké</u> Attiéké variety Bocou3 is the most appreciated compared to Yavo variety.	The variety of cassava influences the quality of attiéké.

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Djeni *et al*. (2011)	Biochemical, physical and sensory characteristics of different types of attiéké (Ebrié, Adjoukrou and Alladjan) have been determined. - Attiéké samples collected in 3 cities: Abidjan, Dabou and Jacqueville. - 18 villages selected. - 3 samples of attiéké were collected / village. - Biochemical parameters: pH, titratable acidity, total sugars, reducing sugars, water content and starch. - Physical parameters: granulometry of dried semolina. - Sensory evaluation of the 3 types of attiéké: The panelists were the students of the Faculty of Food Science and Technology at the University of Abobo-Adjamé. Explanatory sessions were organized with groups of 6 to 8 people. - Descriptors are appearance (color), texture (homogeneity and friability of granules), aroma, cleanliness (presence of fibers, foreign bodies) and taste (sour, sweet) of the 3 types of attiéké. - A scale from 1 = not intense to 9 = very intense was used to describe the intensity of the descriptors. - Microbiological analysis: The quality of attiéké samples was determined after steaming and 3 days of storage. The determined germs are fecal coliforms; yeasts and molds, GAM, enterococci and sulphite-reducing bacteria.		- Attiéké produced in Adjoukrou and Alladjan zones have similar biochemical, physical and sensory characteristics, but were different compared to attiiéké from Ebrié. - The acidity is higher and the taste sourer for Ebrié Attieke. - The microbiological quality becomes unsatisfactory after 3 days of storage at room temperature.	<u>Preparation steps</u> - Variations in biochemical characteristics could be attributed to the variety of cassava that varies from one processing area to another, and to the fermentation/pressing steps that vary from one area to another. - These differences can be attributed to the grating procedure, the duration of fermentation and the moisture content of the dough after pressing. Fermentation found to affect particle size. - The constant quality of the Adjoukrou and Alladjan attieké samples were observed. - Attiéké technology would be very well controlled by Adjoukrou, Alladjan and Ebrié women and this technology would be faithfully transmitted from generation to generation. - However, attiéké production is laborious and time consuming. Due to the high market and increasing food demand, some steps of the attiéké process are sometimes shortened or eliminated and to diversify the quality of many types of attiéké to be given to consumers.	<u>Characteristics of the 3 types of attiéké</u> - The attiéké used as standard had the best taste, expressed by a high content of reducing sugars (46.25 mg / 100 g) and a low content of lactic acid (59.9 mg / 100 g) and acetic acid (10.03 mg / 100 g). - Attiéké Adjoukrou and Attiéké Alladjan had an acidity of 1.71% and a reducing sugar content of 2.08 and 1.71%. - Attieke Ebrié had the highest acid content (2.91%). - The number of particules in 100 g of attiéké varies significantly between the different areas of production, with 70.97granules / 100 g for Adjoukrou sites, 51.55 granules for Alladjan sites, 42.85 granules for Ebrié sites and 29.22 for the standard attiéké. - Ebrié Attieke was the sourest and had the least sweet taste. It contained the most fiber and foreign matter contents. It was different from Adjoukrou Attieke and Alladjan Attieke, which showed similarities in taste and granule size. Both attiéké had intermediate characteristics between standard Attiéké and Ebrié Attieke.	The results show that produced attiéké in each of the 3 regions present a great variability of the physical, biochemical and sensory characteristics due to the transformation process in the different zones. There are correlations between physical, biochemical and sensory characteristics.

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Coulin *et al*. (2006)	Characterization of the attiéké microflora during production - The production of attiéké followed by 15 small-scale production sites at different steps of its preparation. - Samples analyzeds: portions from inoculum, fresh cassava pieces, pulp after grating, pulp after 6 h of fermentation, pulp after 15 h of fermentation, pulp after pressing, granules after drying and the final attiéké - Biochemical characterization: pH, lactic acidity, acetic acidity - Study of microorganisms: bacteria, Lactobacillus spp, yeasts and molds, enterobacteria, Bacillus spp.			For the preparation of attiéké, fresh cassava grated into a pulp and inoculated with 10% of a traditional spontaneous inoculum.	- The inoculum (ferment) contained 8.2X107 cfu / g Mesophilic aerobic germs and 0.2% and 0.1% lactic and acetic acid, respectively. The pH was 5. Lactic bacteria were the dominant microorganisms in the cassava pulp throughout the fermentation with 1.2x109 cfu / g after 15 h. Attiéké had pH of 4.4 and lactic and acetic acid concentrations of 0.6% and 0.1%, respectively.	Fermentation is the key step that determines the quality of attiéké. The dominant and acting microorganisms during this step are lactic acid bacteria.
Nimaga *et al.* (2012)	Influence of traditional ferment and fermentation time on the organoleptic quality of attiéké - % Ferment used: 6%, 8%, 10% and 12% - Fermentation times applied: 6, 12 and 18 h - Determination of pH - Microbiological analysis: lactobacillus, enterococci, yeasts and molds - Sensory analysis: descriptive test with 15 tasters; Parameters: overall acceptability, color, appearance, taste, texture, aroma and granulometry.	The local variety of local Cassava (Improved Africa Cassava) used for this study. Tuberous roots were between 12 and 18 months old	Attiéké obtained with 10% ferment and with 12 h of fermentation identified as the optimum fermentation rates and times for the production of attiéké.	Cassava roots peeled, crushed and washed with water. The ferment pieces inoculated with 6%, 8%, 10% and 12% of traditional ferment respectively, 4 ml of palm oil and ground cassava. The cassava pulp fermented for 6, 12 and 18 h. 2 kg of dough put in a jute bag and pressed until the production of attiéké.	- Microbiological analysis showed that Lactobacillus (9.14 Log cfu / g) are the most important microorganisms in the cassava paste, followed by enterococci (7.64 Log cfu / g), yeasts and molds (7.30 Log cfu / g) respectively. - Sensory analysis revealed that the amount of ferment and the fermentation time have significant effects on the quality of attiéké (flavor).	The traditional ferment in the production of attiéké need to be standardize in order to manufacture this dish on industrial scale.

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Assanvo *et al.* (2006)	Microflora of the traditional ferment made from cassava for the production of attiéké in Dabou - Determination of pH - Number of microorganisms: GAM, total coliforms, thermotolerant coliforms, lactic acid bacteria, Bacillus, yeasts and molds	Variety of cassava IAC or Yacé			The dominant microflora consisted of lactic acid bacteria (5.7 • 107 cfu / g), yeasts (5.5107 cfu / g), Bacillus (3.8 107 cfu / g), enterococci (3.0 106 cfu / g), total coliforms (3.0.106 cfu / g), thermotolerant coliforms (8.0 103 cfu / g) and molds (2.0 106 cfu / g).	Lactic bacteria, Bacillus spp, yeasts, fecal enterococci and molds are the microorganisms that play an important role in the fermentation of cassava. Coliforms can be indicators of contamination of the production environment.
Mégnanou *et al.* (2013)	Physico-chemical characteristics of six new yellow cassava varieties: moisture, dry matter, ash, hydrocyanic acid, oxalic acid, pH, titratable acidity, proteins, lipids, total sugars, reducing sugars, vitamin C, energy value, total carbohydrates and starch				Whole varieties recorded high calories (387.17 ± 0.05-404.31 ± 1.29 kcal / 100 g), carbohydrates (84.30 ± 0.42-88.93 ± 0.53 g / 100 g), starch (72.50 ± 0.04-76.85 ± 0.45 g / 100 g) and total acid (50.19 ± 0.03 97.30 ± 0.05 meq / 100 g), but very low moisture content (4.36 ± 0.06-5.52 ± 0.02 g / 100 g).	All of the varieties in this study had very high-energy values, which confirmed that it is a caloric foods and is part of the FAO food security program.

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Krabi *et al*. (2015)	Production of attieke (fermented cassava-based couscous) in the city of Abidjan The sampling method adopted for this work is the cluster sampling at three degrees of units with, at the primary level, the nine communes surveyed in the city of Abidjan (Abobo, Adjamé, Attécoubé, Cocody, Koumassi, Marcory, Port-Bouet, Treichville and Yopougon), at the secondary level, the processing sites and at the tertiary level the producers surveyed. - Knowledge surveys and preparation of traditional cassava ferment; Preparation, storage and distribution of attiéké; Description of each step of the process - Physico-chemical characteristics: Dry matter content, ash content, total protein, titratable acidity and pH are determined. - Microbiological analyzes: lactic acid bacteria, aerobic total mesophilic flora (FAMT) and salmonella	The varieties of bitter cassava IAC (Improved African Cassava) commonly known as Yace and sweet Bonoua are the most used for production (according to 98.9% of producers).	Three types of attiéké (agbodjama, garba, and normal attiéké () produced generally, of which the most requested is the " agbodjama " type at 48%, the normal type at 37% and the " garba " type at 15%.	In addition to knowledge and experience capitalized field, three elements, namely the type of cassava, the traditional ferment are crucial in obtaining the quality of attiéké following the processors surveyed. Preparation of the ferment Except for the technological treatment (either braised in fire, boiled in water, or fresh, that is to say without any prior treatment) applied to the cassava roots peeled during the preparation of it, there is no fundamental difference in the diagram of operations leading to the preparation of attiéké. Three types of ferment (mangnan): the " braised " magnan (used by 24.4% of the processors, the boiled magnan (used by 75.6% of the processors of attieke and the " fresh " magnan (used by 0% of the producers surveyed). <u>Steps for cassava processing into of the attiéké</u> Peeling, washing, grinding, fermentation (pulp mixed with the ferment for 1 to 2 days), pressing, slicing, sieving, granulating, drying, sieving, winnowing and steaming Fermentation eliminates hydrogen cyanide. After a few minutes of cooking, the product is ready to be consumed.	<u>Sensory properties</u> Taste for 28% of female processor the most decisive criterion in consumer choice of attiéké followed by quality of cassava root (16%), attiéké texture (14%), and color (14%) %), granule size (12%), aroma (10%) and origin (6%) of attiéké. Characteristics of Attieke from the IAC variety Yield: 30.12% Ash: 1.76% Protein: 4.06% pH: 4.4 Acidity: 0.6% Humidity: 47% Total flora: ± 100 CFU / g Lactic bacteria: <102 CFU / g Salmonella: 0 Characteristics of Attiéké from the Bonoua variety Yield: 22.21% Ashes: 1.97% Protein: 4.06% pH: 4.3 Acidity: 0.6% Humidity: 48.53% Total flora: ± 100 CFU / g Lactic bacteria: <102 CFU / g Salmonella: 0	The production of attiéké is still artisanal. In view of the difficult conditions of their job, research on the mechanization of the different steps of the processing should be encouraged in order to guarantee a constant quality of production.

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Ebah-Djedji *et al*. (2013)	Sensory factors of cassava products: attiéké - Parameters: color, smell, taste, consistency and degree of cooking - Cassava roots were harvested at different stages of the growth cycle after planting (11, 13, 15 and 17 months)	Improved varieties of cassava used: CM (52), I88 / 00158, IM84 and TMS4 (2) 1425 and the control variety Bonoua 2	The varieties of cassava have been classified in the following order of preference (color, taste, odor, texture, fiber presence: - Bonoua 2, - I88 / 00158, - TMS4 (2) 1425, - IM84 and - CM (52) A good appreciation of the smell obtained with the variety Bonoua 2 and a bad appreciation obtained with the variety CM (52).	The tuberous roots of cassava peeled, crushed, mixed with the ferment (1 to 2 days). At the end of the fermentation time HCN is eliminated. The pulp pressed, dried and winnowed. After a few minutes of cooking, the product is ready to be consumed.	The color of Attieke of the control variety Bonoua 2 and improved varieties of cassava had ratings ranging from 3.30 ± 1.42 (CM (52)) to 4.53 ± 0.69 (Bonoua 2) (sensory test). The taste of attiéké produced with the 5 varieties of cassava had ratings between 2.80 ± 1.14 (CM (52)) and 4.05 ± 0.11 (Bonoua 2). The improved varieties of cassava I88 / 00158 TMS4 (2) 1425, CM (52), IM84 and Bonoua 2 had ratings of degree of cooking of 3.70 ± 0.82; 3.51 ± 0.80; 3.20 ± 1.14; 3.33 ± 0.51 and 4.30 ± 0.92. Improved varieties of cassava had odor ratings between 2.70 ± 1.06 and 4.30 ± 0.71, except for CM52 and Bonoua 2. The consistency of Attiéké cassava varieties I88 / 00158, TMS4 (2) 1425, CM (52), IM84 and Bonoua 2 had ratings ranging from 2.21 ± 0.21 (Bonoua 2) to 3.95 ± 0.25 (I88 / 00158).	The color, taste, smell, and degree of cooking of the attiéké from the varieties was similarly appreciated.

Source (first author, year)	Methodology	Raw material characteristics	Note any differences in the preferences for the characteristic by region, processing method, ethnicity, gender etc.	Food processing and preparation (disaggregated by gender and other factors of difference wherever possible, if recorded in document)	Characteristics of cassava and attiéké	Comment on your level of confidence in the paper
Sotomey *et al.* (2001)	Study on the evolution of the physico-chemical constituents of cassava during the preparation of attiéké - Physical analysis: granulometry - Chemical analyses: determination of water contents, ash, minerals, lipids, proteins, sugars, starch and HCN as well as pH and titratable acidity were made on the raw material (cassava) then on the final product (attiéké). - Microbiological analysis: microbial flora counted Total aerobic germs, yeasts and molds, total lactic acid amylolytic bacteria are the main groups of microorganisms determined on cassava pulp and attiéké.			The processing of cassava into attiéké includes the following operations: peeling the roots, washing, grinding, fermentation, pressing, several successive sieves, granulating or calibration, winnowing (optional for Beninese), sun drying and steaming. In the chain of operations, variations observed according to the origin of the processors: according to whether they are Beninese or Ivorian.	Agbodjama has a homogeneous particle size. Agbodjama is composed of nearly 77% of granules of diameter between 0.5 and 2 mm, and barely 3% of particles with a diameter of less than 0.5 mm. Attiéké is composed of nearly 64% of granules of diameter between 0.5 and 2 mm and 16% floury fraction (all particles with a diameter of less than 0.5 mm). The pH of the fresh cassava paste is from 6.52 to 4.61 after 12 hours of fermentation, and then rose to 5.03 after steaming. Fresh attieke characterized by its high starch content of 71.61% (± 4.42%) and its low crude protein content of 1.89% (± 0.23%). Losses of hydrogen cyanide (HCN) are high (about 92% cyanogen potential loss) during the processing of attiéké. The total aerobic, lactic, amylolytic flora, yeasts, and molds are considerable in the fermented pulp of cassava. These populations decrease considerably in cool attiéké. The reduction of microbial populations in attiéké could be due to the effect of heat during cooking. Evolution of the quality of attiéké during its storage: Its pH and acidity change during storage. The pH and the acidity content of attiéké pass respectively from 5,03 to 6,52 and of 2,12 to 0,68% of lactic acid on the fourth day of storage (25 to 30 ° C). The population of yeasts and molds decreases to the detriment of the growth of total aerobic germs: the population of aerobic flora increases significantly on the 4th day, it goes from $3{,}4.10^3$ to $2{,}6.10^7$	Attiéké is a cassava-based food from Côte d'Ivoire. The physicochemical characteristics and the microbial flora vary during the processing of cassava into attiéké.

Source (first author, year)	Methodology	Raw material characteristics	Note any differences in the preferences for the characteristic by region, processing method, ethnicity, gender etc.	Food processing and preparation (disaggregated by gender and other factors of difference wherever possible, if recorded in document)	Characteristics of cassava and attiéké	Comment on your level of confidence in the paper
Ebah (2014)	Biochemical characterization of tuberous roots of improved varieties of cassava (*Manihot esculenta* Crantz) and study of the functional properties of their starches: suitability for processing - The study conducted according to the physiological age, in order to know the appropriate period for an optimal yield of harvest. - Harvest period: 11, 13, 15 and 17 months - 30 improved varieties from the National Center for Agronomic Research (CNRA) in Côte d'Ivoire have been used as plant material. - Biochemical components: yield, dry matter, starch, HCN, ashes, proteins, lipids, pH, total sugars, and reducing sugars. - Physical and functional properties of starches: Morphology in Scanning Electron Microscopy, particle size, frequency distribution of mean diameter of native starch granules, viscosity, swelling, clarity of starch solutions, - Texture characteristics and cooking properties: (hedonic test) - Sensory properties (hedonic test) of attiéké: color, consistency, taste, cooking, smell	These varieties are *Yacé, Bonoua 2, Bounda 1, Anango agba, Attiéké M'bossi 2, Bonoua akpessé*, Ka19, Ay15, IM84, IM89, IM93, 88/263, TMS4(2)1425, TMS30572, CM52, CM(2), 9614A, 9620A, 9612A, 971A, 90/00039, 91/02322, I88/00159, I88/00158, 99(27)3, 99(14)5, 99(41)1, 99(10)2, 99(27)1 et 99(28)2 Thirty (30) improved varieties in this study result from several genetic crosses between the broodstock, which may be local varieties or imported varieties. They are part of the varietal collection of the CNRA. The improvement process usually lasts between 6 and 8 years. It is punctuated with tests in peasant environment.	The varieties of cassava used to prepare the attiéké are representative of each group of the 30 varieties. The attiéké prepared from the representative are appreciated in the following order: Bonoua 2, I88/00158, TMS4(2)1425, IM84, CM52	Preparation of ferment (Mangnan) Ferment (Mangnan) obtained from a spontaneous fermentation process. Fresh cassava tuberous roots peeled and boiled in boiling water at 100 ° C for 10 minutes. They were then cooled to laboratory temperature (28 ± 1 ° C) and packaged in a bag that had been used for previous fermentations. The set placed in a basket and stored at the temperature of the storage room (30 ± 2 ° C) for 3 days protected from air and light. At the end of this storage, the leaven (Mangnan) is thus obtained. This leaven ferment represented for 8 to 10% of the fresh cassava are used to prepare the attiéké. The preparation of attiéké is done according to the method described by Aboua (1989).	The harvesting period indicated for an optimal rate of dry matter and starch is 13 months. The contents of hydrocyanic acid, are between 25 and 180 mg / kg Principal Component Analysis (PCA) classified all varieties into 4 classes based on their texture and cooking parameters. **Class 1** characterized by high strength, high cohesivity, low density and low chewability, dry matter of fresh tuberous roots,. They are Bonoua 2, Bounda 1, IM84, 99 (10) 2, 9612A, 9614A, Attiéké M'bossi 2, 99 (28) 2, TMS30572, Ay15, TMS4 (2) 1425, 971A, Anango agba, IM89, IM93 and CM (2). They are interesting for making dough cassava **Class 2** is characterized by high adhesiveness, high elasticity, high leached dry matter and high starch content, and these are 99 (27) 1, Yace, 9620A, Bonoua akpessé, 88/263, 99 (41) And I88 / 00158. They can be recommended for the glue industry. **Class 3** is characterized by good clarity, moderate amount of water absorbed and low swelling: CM52, 99 (27) 3, Ka19, I88 / 00159 and 99 (14) 5, 91/02322. They used for products of good appearance (color) **Class 4**, represented by 90/00039, characterized by a high hardness and a high friability, a low dry matter, a high elasticity, a low cohesiveness and a very low density. the starches studied have granules of heterogeneous shapes of sizes varying significantly from one variety to another and from one group of varieties to another, with values of between 1.94 and 32.81 µm. Attieke: Bonoua 2, I88 / 00158, TMS4 (2) 1425, IM84, CM52	This thesis highlights the technological potential of improved varieties of cassava. However, these varieties remain more or less appreciated by consumers. The research and development of the cassava and derived products sector should move towards technological innovations in the value chain and take into account the qualitative and health aspects to help set standards in the cassava sector. Setting quality standards is a challenge to be competitive at the regional level and to achieve the food security that cassava farming can offer.

Source (first author, year)	Methodology	Raw material characteristics	Note any differences in the preferences for the characteristic by region, processing method, ethnicity, gender etc.	Food processing and preparation (disaggregated by gender and other factors of difference wherever possible, if recorded in document)	Characteristics of cassava and attiéké	Comment on your level of confidence in the paper
Ebah-Djedji *et al.* (2012)	Effect of harvest period on starch yield and dry matter content of tuberous roots of improved varieties of cassava - Different harvest periods: 11, 13, 15 and 17 months after harvest - Determination of starch yield and dry matter content	Five improved varieties of cassava: "Bonoua2", "Ay15", "971A", I88/00158 and "90/00039"	The tuberous roots of improved varieties of cassava harvested at 13 months after planting yield optimal yields and dry matter levels.		All improved varieties of cassava have peaks of dry matter (40.57% ± 2.41) and starch yield (20.17% ± 2.82%) at 13 months after planting. The tuberous roots of the improved cassava variety "Bonoua2" have the highest starch yield at 11, 13, 15 months after planting, with respectively 18.26% ± 1.52%, 20.78% ± 2.57%, and 18.08% ± 3.18%. The highest yield of starch at 17 months after planting, was obtained with the variety "971A" (19.38% ± 2) which also contains the highest dry matter content at 11 and 15 months after planting. The values were 39.83% ± 1.19% and 38.70 ± 2.61% respectively. As for the highest solids at 13 and 17 months after planting, they gave by variety "971A", with respective values of 42.99% ± 1.48% and 39.04% ± 2.57%.	This study shows the effect of the post-planting harvest period on starch yield and dry matter content.

1.3. Food science SoK reporting

Note: Citations are very important – please use in text citations throughout the report. If the characteristic is cited by a number of resources and interviews we can be more confident in the finding.

Note: always disaggregate data by gender and other factors of social difference if possible.

1.3.1. Methodology

Describe the methodology, sample of key informants and the documents reviewed. Consider the literature as a whole, note any gaps in information e.g. lack of gender disaggregated data, data from a particular region, consumer data etc.

The National Research Center of Agronomy (CNRA) has a big root and tuber program based in Bouaké and experiment station in different locations. They have participatory program with farmers. They also work with different end users on the preferences of tuberous roots, especially cassava. This activity aims to take into account user preference for breeding programs. The RTBFoods project, will reinforced CNRA program. The purpose of the RTBFoods project is to identify the preferred characteristics of cassava and attiéké in Côte d'Ivoire at the level of producers, processors, consumers and other user groups. The aims of this project are to provide users with varieties of cassava that will make a quality attiéké. It is in this perspective that key informant interviews were conducted (Nindjin, 2018). These interviews are part of a first study to interview key people to better understand preferences for cassava, attiéké; the markets for cassava and attiéké; the importance of cassava and attiéké in people's lives.

Among the themes (modules) studied, this part will only deal with food sciences. This module will help to understand preferences for cassava and attiéké by geographical area, processing methods, sex, age, socio-economic status, ethnicity and other variables.

In this first phase of preliminary study, 04 key informants (Nindjin, 2018) were interviewed. The information was gathered from interviews with key informants. These writings are their proven experiences in cassava and attiéké. They are mainly researchers, agents of the Ministry of Agriculture, actors in the cassava value chain and attiéké. Each key informant were asked about this knowledge (cassava and attiéké) according to the three (3) axes discussed, including food sciences. Most of the data have been collected during a live interview. Other key informants for reasons of unavailability preferred to reply by email. Scientific articles, reports of studies related to cassava and attiéké have been consulted.

The data, essentially qualitative, analyzed by comparing the information obtained between key informants and those contained in the various articles and reports have been consulted. This information then synthesized to provide answers to the different research questions.

1.3.2. Raw material characteristics

Summarize in a narrative the description of the raw material characteristics that will give a good product identified in key informant interviews and documents using in text citations. Note differences on processing method, gender region, ethnicity etc.

According to interviews with key informants, the most important quality characteristics of the raw material are the type of variety, the age harvestof the variety and the sanitary quality of the variety. The tuberous cassava roots that provide quality attiéké are:
• A relatively cassava high production and dry matter yield of at least 20 t / ha and at least 30% respectively (**Behi et al., 2000**);
• A general appearance of the surface of the root: very good or good, that is to say, no or slight mechanical damage (cuts, cracks, abrasions, bruises, cuts, etc.); no damage by insects (holes,

galleries, wounds, etc.); no decay (wet or dry discolored areas); no or low damage from pests (bite marks, etc.) (Table 1) (**Bainbridge *et al.*, 1996)**;
• No internal deterioration, ie no physiological deterioration; no microbial deterioration; no insect infestation;
• No germination;
• A firm cassava texture pulp;
• A fresh state (not more than 1 day after harvest);
• A smell of fresh cassava root.

Table 1: Rank and definitions for the external appearance of root crops

Rang	Apparence générale de la surface de la racine	Dommages en surface			
		mécaniques	insectes	pourriture	ravageurs
		(% de surface)	(nombre de trous causés par les insectes)	(% de surface)	(% de surface)
1	Très bonne	0	0	0	0
2	Bonne	1-25 %	1-5	1-25 %	1-25 %
3	Modéré	26-50 %	6-10	26-50 %	26-50 %
4	Mauvaise	51-75 %	11-15	51-75 %	51-75 %
5	Très Mauvaise	76-100 %	16 +	76-100 %	76-100 %

(Source: **Bainbridge *et al.*, 1996**)

In general, the variety Improved Africa Cassava (IAC) is the most widely used cassava (26 - 44%) in Côte d'Ivoire, especially in the traditional production areas (South of Côte d'Ivoire). The cassava and attiéké producers justify their attachment to this variety because of the high dry matter content (36%) unlike the Bonoua variety (29%) and because this variety is well suited to the processing into attiéké. In addition to this common variety of cassava, other varieties of cassava are also used depending on the area: in Grand-Lahou, there is the variety Ahoussakplin, in Jacqueville, the variety Ghana, and in Dabou, the variety Bocou 1 (Table 2) (**Projet Firca-IG, 2015**). It has been reported that the Tinandjo variety is one of the oldest cassava varieties used in the Grand-Bridges region (lagoon region), however its current use for the processing into attiéké is very low (1 - 7%). Indeed, some traditional varieties such as Tinandjo and Soklo are becoming increasingly rare. Producers abandon them because of their relatively long planting time before harvest (24 months) and low yields (**Project FIRCA-IG, 2015**). As for the central regions of the country, sweet varieties are often used (Yavo) with different attiéké processing methods than those in southern areas (**Nindjin et al., 2017**).

Table 2: Varieties of cassava grown in production areas in Côte d'Ivoire (**Projet Firca-IG, 2015**)

Variéties	**Origin**	**Planting time before harvest**	**Abidjan**	**Dabou**	**Grand-Lahou**	**Jacqueville**	**Yamoussoukro**
Agué	Traditional	12 months	-	-	-	+	-
Akama	Traditional	12 months	-	+	-	-	-
Bingerville	Traditional	12 months	-	+	-	-	-
Bonoua	**Traditional**	**24 months**	**-**	**+**	**-**	**-**	**++**
Bocou 1	Improved	6 months	-	++	+	-	+
Bocou 2	Improved	6 months	-	+	-	-	-
Dron	Traditional	12 months	-	+	-	+	-
Ahoussakplin	Traditional	12 months	-	+++	+	+	-
Ghana	Unknown	12 months	-	-	-	++	-
Kpey-kpey	**Traditional**	**12 months**	**-**	**+**	**-**	**-**	**-**
Sans manqué	Traditional	12 months	-	+	-	-	+
Soklo	**Traditional**	**24 months**	**-**	**-**	**-**	**-**	**++**
Tinandjo	**Traditional**	**24 months**	**-**	**+**	**+**	**+**	**-**
Yacé ou IAC	**Improved**	**12 months**	**+++**	**+++**	**+++**	**+**	**+**
Yavo	Improved	12 months	+	+	-	-	+++
Types of Attiéké			- Agbodjama - Petit grain - Ntonié - Garba	Ordinary Attiéké	Ordinary Attiéké	Ordinary Attiéké	Garba (*Gbôgbô*)

(-) : Not used; (+) : low use; (++) : Middle use; (+++) : high use

Cassava is cultivated throughout the national territory with dominance in the south, west and central regions. It ranks second among food crops after yam with an estimated production volume of 5.087 million tons in 2015 (DSDI, 2016). The volume of production increased significantly from 2,412 million in 2012 to 4,239 million in 2014 and 5,087 million in 2015 **(DSDI, 2016)**. Cassava is both a subsistence and a cash crop for producers. Derivative products are numerous (attiéké, foutou, toh, flour, starch, gari, etc.) and are the subject of national, sub-regional and international trade.

CNRA has developed high-performance, high-yielding varieties. The first evaluations of these improved varieties of cassava made by **N'Zué et al. (2009)** highlighted their disease resistance and good agronomic performance. Thirty new varieties of cassava from the varietal collection of the CNRA were studied by **Ebah (2014)** whose overall objective was to characterize the tuberous roots of cassava varieties developed by this research center. Among the cassava varieties studied, those which gave

the most appreciated attieke were the varieties Bonoua 2, I88 / 00158, TMS4 (2) 1425, IM84, and CM52.

It is possible to classify cassava varieties into two big groups: the sweet and the bitter ones. The degree of bitterness of each variety depends on the presence of hydrocyanic acid, which is largely dependent on climatic conditions (**Assanvo et al., 2006**). Sweet varieties are consumed fresh while bitter ones are processed before consumption. Sweet varieties are also used to make "Foutou", "Bédècouman", and «Akpessi". Bitter and sweet varietiesare used to make other traditional foods including "Attiéké", "Placali", "Attoukpou", "Konkondé". However, attiéké remains the most consumed cassava product.

1.3.3. Raw material quality characteristics

Summarise the quality characteristics of the raw material at each step of processing and preparation to give a good final product (attieke), identified in the key informant interviews and authors using in text citations. Note differences on processing method, gender region, ethnicity etc.

There are differences in quality characteristics. Indeed, there are three main types of attiéké. (1) The original premium quality attiéké produced by the traditional Attiéké production communities (Avikam, Ahizi, Alladian, Adioukrou, Ebrié); that is, from the Grand-Ponts region (Jacqueville, Grand-Lahou, Dabou) and Abidjan. (2) the ordinary average quality attiéké produced everywhere by non-traditional attiéké communities, and (3) the low quality Garba attiéké produced in Abidjan, but especially in the Center of the country (Yamoussoukro, Bouaké, etc) (**Krabi et al., 2015**). Women essentially do the production activity of attiéké (**Nindjin et al., 2017**).

The characteristics of the tuberous root of cassava at the different steps of processing into attieke are as follows (**Nindjin et al., 2017**):

- **Cassava**: The desired characteristics of cassava roots are a relatively high dry matter content, a freshness of the variety (≤ 1 day after harvest) and a sanitary quality of the variety;
- **Peeling**: ease of peeling;
- **Cutting + Defibering**: weak discoloration of the chips (to plunge the chips in the water to avoid discoloration in the open air), whiteness of the flesh, little central stem ;
- **Washing**: clean wash water;
- **Grinding**: clean crusher (cleared of previous grinding residues, rust and impurities by pre-hot washing of equipment);
- **Fermentation**: Fermentation vat or clean fermentation bag, adequate ferment (5-10%), adequate fermentation time (12-18h);
- Dewatering: a required pressing time (so as to obtain the optimum texture state of the dough to continue processing), a healthy environment (avoid flies, stagnant water around, foul odors)
- **Sieving**: clean and in good condition (to avoid the incorporation of foreign bodies into the product);
- Granulating: clean material, manual peeling in bowls
- **Drying**: on vans (holes facilitate air circulation and drying is more efficient);
- Winnowing: the absence of fibers;
- Steaming: perfectly cooked in the earthenware couscous
- **Attiéké**: appearance of attiéké (yellow chick color, absence of fibers and impurities, visible granules), texture (hard, well-rounded granules, moldable in the hand), taste (pleasant, salty-sweet), odor of freshly cooked fermented cassava product.
- **Packaging**: clean hands for handling the product, and packing material.

Although the processing steps affect the final quality of attiéké, the consumer only appreciates the final product. Thus, quality attiéké must have an agglomerated appearance with conspicuous grains, a characteristic attiéké smell, a salty-sweet taste, a yellow chick color and the absence of fibers and grains of sand (**Kouassi, 2016 Kouassi et al., 2017**).

The microflora of ferment used in the preparation of attiéké contributes to the detoxification of cassava, the softening of cassava paste during fermentation and the improvement of the taste and texture of attiéké (**Coulin et al ., 2006**). The ferment is ready for use at a pH of between 5.4 and 6.1

and at a temperature of around 30 ° C. It is the basis of the organoleptic quality of the different types of attiéké sold on the market (**Assanvo et al., 2006**). Lactic acid bacteria are one of the most important groups of microorganisms involved in the cassava fermentation step, mainly because of their known roles in the development of flavor and preservation of the food (**Yao, 2009**) .

The traditional ferment can be prepared with different varieties of cassava and different processes (**Tetchi et al., 2012**). The attiéké producers use three types of ferment: the "fresh mangnan", "braised mangnan " and boiled mangnan ". The last is the most used. The traditional ferment is obtained from a spontaneous process of fermentation. The ferment is made from one or more varieties (sweet or bitter) of cassava (*Manihot esculenta* Crantz). The fresh cassava tubers are peeled and cooked in boiling water (100 ° C) for 5 to 10 minutes. They are then cooled to room temperature (28-35 ° C) and packaged in a bag or set of fillets that have been used for previous fermentations. The set is packed in a basket or carton and stored at room temperature (28 ° C-35 ° C) for 2 to 3 days. The ferment still represents 8 to 10% of the fresh cassava used for its processing into attiéké (**Assanvo et al., 2006**).

The tuberous roots of cassava are peeled, crushed and mixed with a small amount of previously fermented cassava. The resulting dough is fermented again for one (1) to two (2) days. At the end of the fermentation time, which has largely eliminated the hydrocyanic acid naturally contained in cassava, the dough is dewatered, sieved, dried, drained and then steamed. After a few minutes of steaming, the final product obtained is attiéké, ready to be consumed (**Aboua, 1989**).

The addition of palm oil (1%) facilitates the granulating and avoids the formation of a cake during cooking (**Kouassi et al., 2008**). Fermentation also produces lactic flavors, acetic acid and propionic acid. These organic acids are responsible for modifying the rheological behavior of products during cooking **Yeo (2007)**. **Akely et al. (2007b)** showed that the optimal pressing force to obtain attiéké with good current texture was 1.55 kN.

The moisture content influences the formation of cassava granules. The granule size varies according to the water content of the pulp. There are three types of granules according to the percentage of pulp humidity. The pulp of 40% and 45% moisture gives a majority of very small size granules between 0.4 and 1.25 mm. Those with a moisture content of 55% or more give granules of very large size between 1.25 and 5 mm. The 50% of moisture give granules of average size comparable to standard attieke with a diameter of between 0.8 and 1.25 mm. The fermentation time influences the particle size of the granules and is one of the most important parameters in the production of attiéké. Thus, to obtain granules of better texture and good particle size, the fermentation duration with added “magnan” or ferment should be optimal and between 24 and 36 hours. The ferment or “magnan” content influences the texture of granules.granulating The addition of ferment at rates of 8 to 10% gives granules of texture similar to the standard one (**Akely et al., 2007a**).

1.3.4. Final product characteristics

Summarize the quality characteristics of the final product identified in the key informant interviews and authors using in text citations. Note differences on processing method, gender region, ethnicity etc.

After the interviews with key informants, the sensory characteristics that attest to the good quality of attiéké are conspicuous grains, a specific attiéké odor, a salty-sweet taste, a yellow chick color and the absence of fibers and sand particles. The good physical characteristics are: grain size ≈ 1250 µm, water content 48% -50%. The chemical characteristics are: pH between 4.3 and 4.8; total acidity between 4.2% and 7.5%; HCN content between 2 mg / kg and 2.5 mg / kg (**Kouassi, 2016 ; Kouassi et al., 2017**). The main quality characteristics of attiéké are granule size, taste, color and absence of fibers.

Attiéké is a fermented cassava granular product, steamed with agglomerated appearance, obtained from fresh cassava roots using the following process: peeling, crushing or cutting, washing, grating or grinding, fermentation, pressing or dewatering, sieving, granulating (or rolling), pre-drying, sieving, winnowing and steam cooking (**NI713, 2013**). According to the report of the value chain analysis in Côte d'Ivoire, processors distinguish three qualities of attiéké: garba, standard attiéké and abodjama. The difference between them related to the presence of fibers and the granule size attiéké.

Attiéké "Garba" is a variant of attiéké obtained by the suppression of some steps in the normal process for making attiéké (granulating, winnowing and drying) and a lower amount of ferment (3%) causing a shortening of the production time. It is a sticky and floury product with many fibers. However, it is a high source of energy at low cost (**Djéni, 2009**). It is a product of inferior quality compared to other types. The standard attiéké is obtained after successive unit operations: washing, peeling, grinding, lactic fermentation (using a traditional ferment, mangan), dewatering, granulating, partial drying in the sun, sieving, and winnowing (removal of fibers), and steaming. Abodjama (attiéké of superior quality) is prepared as standard attiéké, but with a calibration of the granules through mesh sieves from finer to coarser to produce lots with granules of homogeneous diameter: abodjama with small, medium, or coarse granules. The residual fibers are eliminated during this sieving step. The steam cooking is longer than for the garba and done in two steps.

According to field surveys, the Ebriés (Abidjan South ethnic group) are the only ones to calibrate attieke granules through different sieves. Attiéké was originally produced and consumed exclusively by some ethnocultural groups: Adjoukrou, Alladjan, Ebrié, Avikam and Ahizi in the lagoon areas of southern Côte d'Ivoire (**Assanvo et al., 2006**). Attiéké from the Yacé variety is the most available and the most appreciated by consumers**(Akely et al., 2007b)**. Studies have identified three types of attiéké in Côte d'Ivoire according to ethnicity. These are Adjoukrou Attiéké, Ebrié Attiéké and Alladjan Attiéké (**Kouassi et al., 2008**).

Adjoukrou, Alladjan and Ebrié are the three ethnic groups in southern Côte d'Ivoire considered as the largest producers and consumers (**Assanvo et al., 2006**). Increasingly, however, the production and consumption of attiéké has spread throughout the Ivorian territory and in the West African sub region, with population migrations (**Sotomey et al., 2001, Djéni et al. 2011**).

Adjoukrou Attieke is composed of a mixture of small and medium grains (**Assanvo et al, 2006**). The set gives a form of attiéké which has a sticky texture, often yellow or cream (shiny), pleasant smell and slightly acidic taste. This type of attiéké can be stored at room temperature. However, when the granules are well dried and well cooked, the storage can go beyond a week or even a month (**Yobouet, 2016**).

Ebrié Attiéké seems to be the most produced in Abidjan. It has three variants: the most common is the attiéké ordinary called Ebrié attiéké composed of a mixture of small and coarse granules. It has a whitish color. The other two variants of the bibliographic review are the Agbodjama with small granules and the Agbodjama with medium granules. Both variants have uniform granules (**Djéni, 2009**).

Alladjan Attiéké, like the other two types, is produced and sold fresh ready for consumption. In this state, it is moist and contains about 50% water with detachable granules, with a sticky texture, a light yellow or cream color, a pleasant odor and a pH of between 4 and 4.5 (**Djéni, 2009**). It is composed of a mixture of small, medium and coarse granules. When the granules are well cooked, the storage can be done beyond a week or even a month.

The traditional Attiéké, particularly the Adjoukrou and Alladjan types, are opposed to the Ebrié type. Attiéké Adjoukrou and Attiéké Alladjan have both a pleasant aroma, with loosely bound granules. However, Attiéké Alladjan has a more heterogeneous texture and Adjoukrou Attieke has a sweeter and less sour taste. These two types of attiéké are different from the Attieké Ebrié essentially in terms of taste and texture. Attieke Ebrié has a sharper taste than the others and it is less sweet. Attiéké Adjoukrou has a finer granule size than the Attiéké Alladjan and Ebrié (**Djéni, 2009**).

1. **Comment on your level of confidence in the information you reviewed.** E.g. assessing research findings given the methodology and sampling frame, gender disaggregation.
2. **Include any other information relevant to other modules** (gender and socio-economic context and product demand, or relevant findings from papers that exist on other products).

1.3.5. Quality characteristics

	Quality Characteristics (and range, if possible) to achieve a good product * specify variation with process/region/user group – complete multiple tables if necessary	**Mean ranges for the quality characteristics** (from literature if available)	**Evidence to substantiate** (refer interviews and/or add citation sources)	**Your confidence in the information** (low, med, high) + reason
Cassava	-Aspect -Color -Texture -Taste -Masticability -Fiber Presence -Period of harvest	-Mealy or translucent -White or yellow -Strong or hard -Bitter or sweet -Easy or difficult -Little or many scale: 0 to 10 (intensity) -13 months after planting	Akely et al. (2016)	Level of confidence: High Study of varieties of cassava and their derived products.
	-Dry matter -Starch -Sugars	Variation according to the variety	Mégnanou et al. (2013)	Level of confidence: Mean This study was limited to characterize the physicochemical improved varieties of cassava
	-Varieties of cassava -Period of harvest after planting - Yield of starch and quality -Water content	11 to 17 months after planting	Ebah (2014)	Level of confidence: Mean Thesis highlighting the nutritional and technological potential of improved varieties of cassava
	-Dry matter	11 to 17 months after planting	Ebah-Djédji et al. (2012)	Level of confidence: High This study shows that the harvest period has an impact on the yield and dry matter of the tuberous root of cassava

	Quality Characteristics (and range, if possible) to achieve a good product * specify variation with process/region/user group – complete multiple tables if necessary	**Mean ranges for the quality characteristics** (from literature if available)	**Evidence to substantiate** (refer interviews and/or add citation sources)	**Your confidence in the information** (low, med, high) + reason
Transformation steps / preparation				
1. Granulating	-Semolina form	-Grains fins -Homogeneous semolina	Akely et al. (2010)	Level of confidence: Mean
2. Fermentation	-pH	-Variation of pH Normal pH values are between 4 and 5.	Coulin et al. (2006)	Level of confidence: High This document is very important because it makes it possible to follow the evolution of the pH during the transformation of cassava into attiéké
	-pH	-Variation du PH Normal pH values are between 4 and 5.	Nimaga et al. (2012)	Level of confidence: High The importance of the traditional ferment of attiéké production is necessary to standardize the problem of making attiéké
	-Rate of ferment -Types of fermentation -Overwall Acceptability - Grain sizes -Color -Aspect -Taste, aroma -Texture		Sotomey et al. (2001)	Level of confidence: High

	Quality Characteristics (and range, if possible) to achieve a good product * specify variation with process/region/user group – complete multiple tables if necessary	**Mean ranges for the quality characteristics** (from literature if available)	**Evidence to substantiate** (refer interviews and/or add citation sources)	**Your confidence in the information** (low, med, high) + reason
Attiéké	Flavor	-Hedonic scale: 1 (unacceptable) to 9 (excellent)	Aboua (1989)	Level of confidence: High The methods of this author are so far used for sensory evolution.
	-Taste -Smell -Color	-Hedonic scale: 1 (unacceptable) to 9 (excellent)	Gnagne et al. (2016)	Level of confidence: High The taste, smell and color are the main parameters determining the quality of attiéké
	-Aspect -Color -Fiber -Texture -Taste -Masticability	- Scale: 1 (unacceptable) to 10 (excellent)	Akely et al. (2016)	Level of confidence: High Study of varieties of cassava and their derived products.
	-Granulometry -Reducing sugar content -Total acidity -Color -Texture -Aroma -Fiber -Taste -Masticability	-Number of grains -Descriptive scale 1 (not intense); 9 (very intense)	Djeni et al. (2011)	Level of confidence: High Results of this article and the pertinent publication journal.
	-Granulometry -Type of cassava - Traditional ferment -Taste -Quality of the root -Texture -Color	- Hedonic and descriptive scales	Krabi et al. (2015)	Level of confidence: High This study is very important for the standardization of attiéké nationally and internationally

	Quality Characteristics (and range, if possible) to achieve a good product * specify variation with process/region/user group – complete multiple tables if necessary	**Mean ranges for the quality characteristics** (from literature if available)	**Evidence to substantiate** (refer interviews and/or add citation sources)	**Your confidence in the information** (low, med, high) + reason
Attiéké	-Color -Odour -Taste -Consistency - Cooking -Period of harvest after planting	-Descriptive scale -11 to 17months	-Ebah-Djedji et al. (2013)	Level of confidence: Mean. Improved cassava varieties have technological potential
	-pH - Granulometry		Sotomey et al. (2001)	Level of confidence: High
	-Color -Consistency -Taste -Cooking -Odour	- Hedonic scale	Ebah (2014)	Level of confidence: Mean. Improved cassava varieties have technological potential

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2. GENDER AND SOCIO-CULTURAL CONTEXT

2.1. Key findings

- The most popular cassava varieties are older (or traditional varieties) such as Yacé and Bonoua, that make the best attiéké. Yavo and Bocou varieties are improved varieties and introduced recently but have low rates of adoption, particularly the Bocou varieties as processors (predominately female) report that they do not make good attiéké.
- Abidjan and its surrounding areas have the largest areas of demand and consumption of fresh cassava and processed products (attiéké and placali) in Côte d'Ivoire.
- Cassava production is more typically for women in the country. At household level, farming on common plots is the general practice, but due to the fact that cassava is becoming a cash crop, men and women tend to farm on separate plots. On common plot, men are involved in some production activities, but women take over the management role of cassava because the production is mainly for household consumption.
- Cassava is typically monocropped in the south of the country and in plots under one hectare for men and women, and mainly intercropped (yam, rice and corn) in the rest of the country, including on cash crop farms at young stage (rubber, palm oil, cashew and cocoa). Production generally does not involve fertilisers and herbicides, however the latter is an increasingly common practice
- The activities under male control are clearing the plot, cassava fresh roots harvest, and transport of cassava products (fresh roots, and distribution of attiéké).
- The most common cassava products in the country are Attiéké, Placali, and Foutou. But more than 20 uses of cassava have been reported in Côte d'Ivoire.
- Cassava processing labour including the principle cassava products attiéké and placali processing, are done by women who sometimes hire immigrant women. The people of the South (Ébrié, Adjoukrou, Alladjan...) in Abidjan and its surroundings are dominant in attiéké processing. In this region, cassava is an economic activity that is mainly produced by immigrants (Burkinabe and Malian).
- Most wholesalers are typically from the ethnic groups in this region. However, retail sellers are from all ethnic groups and tend to be women between 20 and 40, with primary or secondary education. Most of the fresh placali is produced by women country wide from South to North. Marketing of cooked placali is women's tasks and is dominated by Baoulé ethnic group.
- A key asset required for cassava production is land, which is a significant constraint for women and migrants. Assets for processing are pots, water, red palm oil, among others.
- Attieké processing is dominated by women because of the important of the product for household consumption, which aligns with traditional gender norms where women are responsible for food. For some ethnic groups such as Ebrié and Avikam, attiéké processing influences the social status of women: women who can't process attiéké are considered as immature socially and cannot marry easily.
- As cassava is becoming a cash crop, more and more men are engaged in its production. Therefore, processing and commercialization still remain the property of women but this may change in the future.
- There is strong competition between attiéké and placali, another product from cassava, however, placali has less tedious in processing compared to attiéké.
- Constraints specifically for women: limited knowledge of the dynamic of market, lack of market coordination, poor cassava yields with traditional cropping systems, lack of access to credit. There is a high demand for cassava yet it is difficult for processors to meet the demand due to their capacity.
- Opportunities: Attiéké processors in cooperatives can increase their income and reduce the drudgery of their work by pooling the efforts of individual – however currently cooperatives are weak.
- The integration of gender is an important factor for cassava products according to the Ministry of agriculture.

2.2. Introduction

2.2.1. Objective of this study

The aim of this module is to collect information on the gender and socio-cultural context of the Attiéké in Ivory Coast, drawing on Gender Dimensions Framework (Rubin, 2011). The objective is to start to develop user profiles for the crop (cassava) and product (Attiéké) along the product chain, and identify the gender dimensions at each stage. 'Users' refers to all people who use the crop or its product(s) (production, processing, trade, consumption), for food, income or other purposes. 'Use' refers to all uses or products from the crop. Collecting information on all uses of the crop will allow us to understand gender differences between products from the crop, and possible trade-offs between preferences. This will help us develop social targeting methods to consult about product preferences, identify the factors that influence preferences and broader adoption and decision making practices.

2.2.2. Research questions

1. What are the agronomic norms and practices of the crop (e.g. intercropping with X, Y and Z, rotation, separate male/female plots etc.) in the country?
2. Have new varieties of the crop associated with the product been introduced in the country and is there expertise or evidence on the factors influencing adoption in this context?
3. What are the different uses and products of the crop?
4. What are the Gender Dimensions of the product value chain (refer to framework below) and the main alternative uses or products of the crop?
5. Are there trade-offs between different uses of the crop? Does this affect different groups of people's participation, workload and benefit from the crop/product?

2.3. Methodology

The methods used are based on two key elements: interview of key informants and document review.

2.3.1. Interview of key informants

Five (5) key informants were interviewed using the template provided (Annex 1):

- 1 urban woman, an attiéké producer, from Blokauss, Cocody, Abidjan (identified as Key Informant 1, KI1),
- 1 woman from women's producer and processing organizations, the President of cassava Innovation Platform of Dabou (identified as Key Informant 2, KI2),
- 1 man from Ministry of Agriculture (identified as Key Informant 3, KI3),
- 1 male researcher from Centre Suisse de Recherche Scientifique, CSRS (identified as Key Informant 4, KI4),
- 1 male researcher from Centre National de Recherche Agronomique, CNRA (identified as Key Informant 5, KI5).

2.3.2. Document review

About eight (08) documents (published within the past ten years) were reviewed using the template provided (Annex 2, and Annex 3).

2.3.3. Data analysis

Data collected (quantitative and qualitative) from key informant itnerviews and the literature review was analyzed according to the research question and summarized in an narrative.

2.4. Results

2.4.1. Agronomic practices and past experiences of adoption relevant to the crop

New varieties of the crop introduced in the country, experience of adoption of these varieties by producers, and differences among the population

Key Informant 1 (KI1) does not give any answer to this question. According to Key Informant 2 (KI2), six (6) new varieties have been introduced (Bocou 1, 2, 4 et 6; Yavo, Yacé). Key Informant 3 (KI3) cited only three (3) new varieties (Yacé, Yavo, and Bocou varieties). According to him, improved cassava varieties, such as the Bocou varieties are less adopted as indicated also by Perrin *et al*, (2015). The processors say that they do not produce a good attiéké. However, many experiences show that Bocou varieties and the other cassava varieties all give the same attiéké with the same sensory and organoleptic qualities. Key Informant 4 (KI4) gave more details to this question, along with document review (Mobio *et al*, 2017). According to KI4, cassava production is a cultural activity in Côte d'Ivoire. There are forms of justification of practices and knowledge underlying its production systems. In fact, in the Abidjan area, most cassava varieties cultivated are traditional varieties and their yield is low compared to improved varieties. Their cassava cropping systems are traditional, which means that farmers don't use a lot of fertilizers and pesticides, and they do not follow a special cultivation technique or cropping system. The autochthonous of this region whose staple food is attiéké justify the production of these traditional varieties by the fact that they produce the best attiéké. In their opinion, to have high quality of attiéké, it is better to use traditional cassava varieties. Then, at Abidjan and its surroundings, one of the largest areas of production (about 33% of national production) and consumption of fresh cassava root in Côte d'Ivoire, the traditional varieties still dominate processing of attiéké (Perrin *et al*, 2015). The main traditional varieties used are Yacé (the most important), Yavo and Bonoua. The importance of these varieties was proved during the shortage of cassava from end 2015 to early 2016 where the price of 2 to 2.5 tons of fresh roots of Yacé was 300,000 FCFA and the same quantity of fresh roots of an improved variety called Chikaya was 180,000 FCFA (Mobio *et al.*, 2017). But, it is also important to notice that, some of new improved varieties of high yield such as Bocou varieties developed by National Agricultural Research Center (CNRA), in reference of Bocou 1 variety are adopted by farmers. Key Informant 5 (KI5) recognizes that improved varieties such as Bocou varieties have been introduced in Côte d'Ivoire since 2014. But, he only talks about those that are still in research station for screening or evaluation tests. According to him, adoption rate of new varieties by producers or processor depends on the production or processing objectives. In general, all the introduced varieties can be used to process attiéké and placali. Giving his experience on adoption of cassava varieties, KI5 indicated that the adoption rate of improved varieties by producers who have attiéké and placali as staple food or sell cassava to processors of these products is about 25%. This adoption rate can be higher and can reach 30% when the variety has high yield potential and is good for multiple uses.

Agronomic norms and practices of the crop (e.g. intercropping with X, Y and z, rotation, separate male/female plots, etc.) in the country

KI1 and KI3 did not give answers to this question. KI2 talks about planting methods recommended by research or extension services such as planting cassava 1 m between the lines and on the lines to facilitate the weeding. But this good agronomic practice is not widely adopted. For KI4, the fields of cassava are generally properties of the household. The head of household (typically male, in both patrilineal and matrilineal customs) rode the plot, do the planting and entrusts the management of other activities such as clearing of the farm, harvesting fresh cassava, processing cassava, selling the products) to the woman , because the fields have a double objective: household self-sufficiency for food and sale of crops for income. In the social division of labour, women are the ones who take care of all that is food in the household. So, they are entrusted the management of the food resources of the household by entrusting the management of cassava fields. In some cases where there are separate plots, there are no differences in cropping systems between men plots and women plots. According to KI5, cassava is often grown alone (monocropped) in the Southern part of the country and the estimated

areas of farms are less than one hectare by women and men. In the rest of the country, cassava is often grown intercropped with yams, rice and corn. Cassava can be cultivated also as intercrop in the cash crop farms such as rubber, palm oil, cashew and cocoa at the young stage ((Perrin *et al*, 2015). Traditionally, women are more represented in cassava production than men. But nowadays, as cassava is becoming a cash crop, men are more and more involving cassava production at household level by having their own plots separate from women's plots. Even in separate plots, there are always common plots for household consumption.

2.4.2. Uses of the crop

Different uses and products from the crop (of which the product is derived)

Most of the products from cassava roots produced in Côte d'Ivoire citied by almost all the KI are Attiéké, Placali, Foutou, Starch (used by industries), Congondé or Dried cassava or Toh, Atoukpou, and Flour used as complement of wheat flour for processing of bread. But the tree main products are Attiéké, Placali and Foutou (Perrin *et al*, 2015). According to KI5, cassava is consumed and marketed locally, in the West African region and in Europe. It has been reported in Côte d'Ivoire more than 20 uses of cassava. Most of domestic uses of cassava in Côte d'Ivoire are under women control.

2.4.3. Gender (and social difference) Dimensions Framework findings

People involved in cassava and attieke labour in production, processing/preparation, selling and consumption, of each of the different uses of the crop (e.g. probe from a gender and social difference (e.g. age, ethnicity etc.) perspective).

KI3 and KI5 gave no answers to this question. But, according to KI1 and KI2, labor is essentially from family and/or a cooperative. However, if the tasks are important, Moré women (from Burkina Faso) are hired and paid per working day. KI4 gave more details on labor used from production to processing citing two main documents. According to him, cassava production is more important in the area of Abidjan (Abidjan and its surroundings) by immigrants. But, land access by these immigrants is difficult to extend their farm areas. This limits their production mean. In cassava production labor is scarce and becomes more and more expensive. Immigrant mainly produce cassava for selling fresh roots.

Attiéké processing: labour is essentially from family in the South particularly in Abidjan and its surroundings. This workforce is dominated by the female gender, who are typically uneducated and quite poor (Bouabre Gnoka Modete, 2012): The people of the South (Ébrié, Adjoukrou, Alladjan...) in Abidjan and its surroundings are dominant in attiéké processing (FIRCA-IG project, 2015).

Attiéké marketing: most wholesalers are from ethnic group of Abidjan and its surroundings. As for the retail sellers they are from all ethnic groups. This activity is dominated by women whose age is between 20 and 40 and more. They have mostly primary and secondary education level and are middle social class (Nindjin et al., 2017), that is different from Bouabré, 2012.

Placali (fresh and cooked) marketing: most of the fresh placali is produced by women country wide from South to North. Marketing of cooked placali is women's tasks and is dominated by Baoulé ethnic group.

Crop users that are primarily under women's control

All the KI showed that most of the activities, from cassava production on farm to principal products (attiéké and placali) processing, are done by women who sometimes hire immigrant women. According to KI5, it is estimated at 80% and more of women are involved in processing and marketing of attieké. At the level of cassava production, the proportion is higher than 60% (VCA4D, 2018).

Crop uses that are primarily under men's control

It is commonly known according to all the KI that men play a less significant role in cassava production on farm to principal products (attiéké and placali) processing. Activities under their control are cassava fresh roots harvest, and transport of cassava products (fresh roots, and distribution of attiéké) mostly in the South and Centre of the country.

People who benefits from the production, processing/preparation, selling and consumption, of each of the different uses.

KI2 and KI5 gave no answers to this question. In KI1's opinion, transporters and resellers (wholesalers) make more profit. KI3 referred to the final report of the following study: "*Analyse de la chaîne de Manioc en Côte d'Ivoire*" (Mendez et *al.*, 2017) for answers, whereas KI4 gave the following details on who benefits for all the cassava value chain actors:

Production of fresh roots: men

Processing: women

Sale of products (fresh roots and processed): women and men

Use: the entire population of Côte d'Ivoire

Resources required for production, processing/preparation, selling and consumption of the crop/products, and different levels of access for certain groups.

For this question, KI3 and KI5 did not give any answer. KI1 insisted on According to her, in Blokauss area, attiéké processing is exclusively done by Ébrié women. KI2 and KI3 talked about access to land resource and its importance for cassava production. According to them, women do not inherit land and men have more access to land than women and this is not linked to matrilineal or patrilineal system. To have access to land to produce cassava in Dabou region for instance, women can form group and apply for land acquisition from the leadership of the village. It's the leadership who decides the area of land to be given to women organizations. According to KI4, for processing and sale activities, women do not have access to credit because their activity is considered as informal sector activity.

2.4.4. Norms, beliefs and perceptions influencing roles and access

Norms, beliefs and perceptions that you believe that are behind these different roles and levels of access in questions 4, 5, 6, and 7

No answer gave by KI1, KI2, and KI3 to this question. KI4 gave more details in three main points:

For question 4: In the South region such as Abidjan and its surroundings, cassava is an economic activity that is mainly produced by immigrants (Burkinabe and Malian) to meet autochthonous and Abidjan market demand for Attieké and increase their revenue. This situation is due to the fact that the production of cassava is a social activity that is seen by locals as being for domestic consumption. Then, these autochthonous produce cassava depending on their food habit as attiéké is their staple food.

For questions 5 and 7: Attieké processing is dominated by women because originally the activity was intended for household consumption. In addition, in social division of household tasks, women deal with food. For example, in some ethnic groups such as Ebrié and Avikam, attiéké processing is a social activity that participates in the construction of the social status of women. Indeed, in these populations, women who can't process attiéké are considered as immature socially. These can't get married easily.

For this reason, attieké processing is exclusively for women in these societies. Attieké processing allows measuring the level of maturity of women and their ability to hold a home. Attiéké is part of daily meal of people in the south of Côte d'Ivoire.

For question 6 and 7: At cassava crop production level, men dominate because land is their property. So the management rules of this strategic resource are men's duty. They decide what to do on these lands and how to do it. Women have mainly access to land for food crop production through marriage (Mobio, 2017) and it is the reality countrywide.

According to KI5, perceptions that are behind these different roles and levels of access in questions 4, 5, 6, and 7 can be revealed in the collective conception that cassava is a food crop, so people associate its production, processing and marketing to women. But, as cassava is becoming a cash crop, more and more men are engaged in its production. Therefore, processing and commercialization still remain the property of women but this may change in the future.

Trade-offs between different uses of the crop, and those that affect different groups of people's participation and benefit from the crop/product (cassava/attiéké)

No answer is given by KI1, KI2, and KI3 to this question. KI5 said that there are no trade-offs between uses of the crop whereas KI5 gave a positive answer with a documents review. According to him (KI5), attiéké is in strong competition with placali, another product from cassava, which is less tedious in processing because the final preparation is done by consumers, so less steps than attiéké processing. Placali is exported and also consumed at national level. This can contribute to shortages of attiéké and raise prices (Gbezo et al., 2017). In addition, being dependent on cross-cutting and multisectoral activity such as transport, the couple cassava/attiéké sector can meet the lack of availability of vehicle or increase of price of transport that influence the price at the consumer level (Gbezo et al., 2017; Nindjin et al., 2017).

2.4.5. Laws, policies, institutions influencing crop use, participation and benefit

Laws, policies, institutions (including farmer/processing groups) that influence how (what products), who or where the crop is used, and the way it affects the participation and benefit of certain groups

KI1 and KI2 gave no answer to this question. KI4 and KI5 found that there are no laws, policies, institutions (including farmer/processing groups) that influence how (what products), who or where the crop is used. KI3 gave some initiative of the Ministry of Agriculture. According to him, the Ministry of agriculture (MINADER) is planning to organize and institutionalize cassava value chains in the country and to implement, through the 11th FED, a project for development of cassava. And Gender department at Ministry of agriculture also wants the integration of gender aspect in all cassava projects, but there are no elaborated laws yet.

2.4.6. Gender based constraints and opportunities

Gender-based constraints and opportunities women, men and other social groups experience with the product

No answer is given to this question by KI1, KI2, KI3, and KI5. But KI4 gave some constraints and opportunities of the different actors of cassava value chain in Côte d'Ivoire based on a document review as follows:

Constraints: Women who are engaged in attiéké processing face many constraints such as conservation of cassava roots (very perishable raw material: 1-2 days) and also the product, attiéké

(perishable product: 3-7 days). In addition, they have limited knowledge of the dynamics of the attiéké market or demand. In this channel, the producers are the most impacted by the dynamics of supply and demand on the market. Another constraint is related to the lack of coordination between the different actors in the attiéké value chain (lack of inclusion of value chain) (Nindjin et al., 2017). In cassava value chain, the relationships between the actors remain low and highlight the inefficiency of the sector, thus affecting the profitability of the trade. In fact, whereas producers and processors are seeking attractive opportunities and promising for their products, buyers complain about atomization and the lack of reliability, consistency and stability of cassava and attieké market (Nindjin et al., 2017). More on, consumers' quality requirements do not always meet their satisfaction (Nindjin et al., 2017).

Climate change effects and inadequate farming techniques influence negatively cassava crop production. Then there is a big gap between potential yields and farmers' yields. In addition, there is a lack of production or processing machines despite the creation of Institut de Technologie Tropicale (I2T).

Opportunities: Organisation of Attiéké processors in cooperative countrywide can increase their income and reduce the drudgery of their work by pooling the efforts of individual (Nindjin et al., 2017). However, the potential of the market for individual sellers and cooperatives is weak (Nindjin et al, 2017). In addition, they think that if no help from government to acquire modern processing machines, they cannot reach their economic goals. This pessimism is endangering the added value of traditional activity that is the fruit of indigenous knowledge. Indeed, introducing new technologies such as using of machines in attieké processing is good, but this implies also a standardization of practices and techniques and equalization, or even a reduction of the price.

For sellers of kind of attiéké called Garba and restaurants, the future of attiéké is not compromised because attiéké became a staple food of Ivorian people (Nindjin, 2017). For example, a person interviewed says: "*now if someone has not eaten Attiéké, he is not happy*". Indeed, for these actors, there is a potential market for attieké, but it is limited by several factors such as: the purchasing power of customers and the increasingly high cost of attieké and fish. The capital is insufficient in its allocation between attiéké and fish.

For business owners, the market potential of attieké is interesting because of two factors: the expansion of the opportunities (to new markets) and the extension of conservation period of attieké. These business owners who use modern techniques and technologies (machine) process more quantity of attieké compared to traditional processing methods. However, this production seems insufficient facing the increasing growth of the market demand of attieké. To cope with this rapid growth in demand, companies must increase their capacity. One of business owners gave us his production plan in these words: "*currently, we process 4 tons a month of attieké, but from august 2017, we are going to double our production (8 tons) and up to 2018, it will be 24 tons a month*" (Nindjin et al..) 2017). In addition, supermarket owners are more and more interested in attieké business opportunities.

However, the financial aspect between attieké processing business owners and bank owners is fair despite the potential of the sector. Creating solid cooperatives can be a solution to get funds from banks owners in order to develop attieké industries which can create wealth and jobs (Nindjin, 2017) by producing dehydrated attiéké which can be conserved for long period and reduce post production losses, because fresh attiéké showed its conservation limits.

2.5. General comments on information collected

The information collected from key informants reflect more or less the realities of the production, processing and commercialization of cassava in Ivory Coast described in the articles and other documents reviewed. Indeed, the main varieties are, on the one hand, old introduction varieties such as Yacé and Bonoua, and, on the other hand, Yavo and Bocou varieties which are improved varieties of recent introductions with a low rate of adoption, concerning especially Bocou varieties. The implementation and management of cassava farms are usually in the traditional way. It should be noted that the use of herbicides is becoming increasingly common practice in cassava-based cropping systems.

The activities of production, processing and marketing are dominated by women. However, their access to resources (land and financial) is limited. The main products of the processing of cassava are: attiéké, placali, starch, congonde or dried cassava gold toh, atoukpou, and flour.

Generally in Ivory Coast food crops like cassava are the domain of women and participate in their social emancipation. For some peoples living in the southern part of Côte d'Ivoire, processing attiéké is an activity of the social status construction of women and the ability of a woman to hold a home is measured by her ability to transform cassava in attiéké.

Cassava value chain actors who are mainly women face some constraints such as the difficulties to conserve fresh cassava roots, as well as the main product which is attiéké. There is also lack of coordination between the different actors in the attiéké value chain. Moreover, there are the effects of climate change and traditional production techniques that negatively influence the yield of cassava farmers. Despite these constraints, there is a great market potential of attiéké because attiéké became a staple food of Ivorian people and, outside the country, demand for attiéké is increasing every year.

2.6. Conclusion

This study aimed to collect information on the gender and socio-cultural context of attiéké. The objective was to start to develop user profiles for cassava and attiéké along the product chain, and to identify the gender dimensions at each stage. It revealed that the activities of production, processing and marketing are dominated by women. However, their access to resources (land and financial) is limited. Generally in Ivory Coast food crops like cassava are the domain of women and participate in their social emancipation.

Cassava value chain actors who are mainly women face some constraints such as the difficulties to conserve fresh cassava roots, as well as the main product which is attiéké. Despite these constraints, there is a great market potential of attiéké because attiéké became a staple food of Ivorian people and, outside the country, demand for attiéké is increasing every year. Therefore, cassava value chain or attiéké value chain is one of the dynamic ways of empowerment of women in Côte d'Ivoire.

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2.8. Annexes

2.8.1. Annexes 1: Interview of key informants-Gender aspects

Annex 1.1: Key Informant 1 (KI1): Mme DIECKET Kouadio Marguerite (Urban Attiéké producer from Blokauss, Cocody, Abidjan)

1. Key informant information

1.1 Consent to participate in interview (Y/N) If no, terminate interview	**OUI**	**1.4 Job title**	Transformatrice d'attiéké à Blaukauss.
1.2 Name	DIECKET Kouadio Marguerite	**1.5 Institution/programme**	
1.3 Gender	F	**1.6 Experience regarding the product and/or your organisation**	28 ans dans la fabrication de l'attieké

2. Raw material characteristics

2.1 Pour avoir un attiéké de qualité, quelles caractéristiques doivent avoir la matière première (le manioc) ? exemple : apparence physique, odeur, toucher, goût, texture, acidité, .., HCN.	**2.2 Pour ces caractéristiques, les préférences diffèrent-elles par région, méthode de transformation, groupe ethnique, genre ?**	**2.3 Quelle sont les preuves ou expériences qui soutiennent vos déclarations (s'assurer qu'il y a une source écrite qui corrobore ces informations)**	**2.4 Quelles sont les 2 ou 3 plus importantes caractéristiques de qualité de la matière première ? (spécifier pour qui et où)**
Manioc à peau blanche (Yace) qui produit de l'attieké blanc Manioc à peau rose qui donne de l'attieké d'une couleur un peu jaune mais pas toujours apprécié des clients	Méthode de transformation diffère selon le groupe ethnique	Pratique la transformation depuis 1990 Transmission des connaissances de génération en génération	

3. **Steps in food processing and preparation**

3.1 Quelles sont les étapes de fabrication/préparation de l'attieké?	**3.2 Y a- t-il des différences dans les caractéristiques de qualité par région, par méthode de fabrication, genre?**	**3.3 Quelles sont les caractéristiques physiques, chimiques et de qualité connu pour chaque tape jusqu'au produit fini, préférence des consommateurs**	**3.4 Quelles sont les caractéristiques sensorielles, physiques, chimiques, nutritionnelles de l'attiéké (apparences, odeur, arome dans la bouche)**	Quelle preuve ou expériences qui soutiennent vos déclarations	**3.4 What are the two or three most important quality characteristics? Specify for who, where etc.**	
					Raw material	**Final product**
1. Préparation du ferment (manioc précuit ou braise)	Chez les Ebriés de Blokauss les maniocs sont précuits et fermentés dans des sacs en jute et recouvert par une bassine pendant 3 jours tandis que chez les Baoulé, le manioc est braisé et fermente pendant plus de 4 jours.					
2. Melange manioc cru + ferment						
3. Broyage du melange						
4. Homogénéisation du melange						
5. Obtention de la poudre						

6. vanner et obtention de l'abodiaman	Plusieurs tamis sont utilisé pour avoir diffèrent types de d'attieké (abodiaman 1,2, 3 et l'attieké fin) Seul les Ebriés ont cette répartition de l'attieké					
7. cuisson et conditionement	la cuisson chez les Ebriés de Blokauss peut être assurée par une tierce personne. La semoule fraiche obtenue peut être revendue	l'attieké doit avoir une couleur blanche	l'attieké doit avoir un gout sucré, des grains compacts qui se détachent aisément entre les doigts			

4. **Other information of note:** Use this space as an opportunity to record findings relevant to other modules such as the gender and socio-economic context (including its influence on preferences).

4.1. Gender and socio-cultural context

4.1.1. User dynamics

Question	**Réponse**	**What evidence or experience do you have that would substantiate this?** (ensure to collect any written evidence or recommendations of information sources)
2.1 Y a-t-il de nouvelles variétés introduites dans le pays? quelle était l'expérience de l'adoption de ces variétés? Y avait-il des différences constatées dans le statut d'adoption au sein de la population? Décrire.		
2.2 Quelles sont les normes agronomiques et pratiques culturales du manioc dans le pays		

2.3 Quels sont les usages et produits dérivés du manioc?	Attieke, Placali, Amidon	
2.4 Pour chaque produit issu du manioc, quelle main d'œuvre est impliquée dans les activités au niveau de la production, de la transformation/préparation, de la commercialisation et de la consommation?	La main d'œuvre est essentiellement familiales cependant en cas de taches importantes, les femmes d'origine Moré sont sollicitées et payées à la journée de travail	
2.5 Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les femmes?	Toutes les étapes de transformation sont en majorité dominées par les femmes qui peuvent solliciter d'autres femmes d'origine étrangère	
2.6 Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les hommes?	Le transport de la matière première (manioc frais) et la distribution de l'attikée est assurée par les hommes à l'aide de véhicules bâchés (3 tonnes).	
2.7 En général, pour chaque utilisation du manioc (produits), qui tire bénéfice de la production, de la transformation/préparation, la vente et la consommation ? (examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)	Selon moi, les transporteurs et revendeurs (grossistes) tirent le meilleur parti	
2.8 Quelles sont les ressources nécessaires à la production, la transformation/ préparation, à la vente, la consommation du manioc /attiéké. (terre, crédit, matériel, les intrants …) ?	Pour la transformation, le matériel est constitué de marmite, un couscoussier, de l'eau, de l'huile de palme rouge, La fabrication est exclusivement réservée aux femmes Ebrié dans la zone de Blokauss	
2.9 Quelles sont les norms, les croyances et perception qui sous-entend 4, 5, 6 ?		
2.10 Avez-vous noté une sorte de compétition /compromis dans les différents usages que l'on peut faire du manioc ? Cela affecte-t-il la participation des différents groupes et leur bénéfice tiré du manioc/attiéké		
2.11. Existe-t-il des lois, politiques, institutions (groupe de producteurs/transformateurs) qui influencent comment est utilisé le manioc, où il est utilisé et qui l'utilise? Cela affecte-t-il la participation et le bénéfice de certains groupes?		

2.12. En rapport avec l'attiéké et selon le genre, quels sont les contraintes et opportunités des hommes, des femmes et groupes sociaux ?		

4.2. Template: gender and socio-cultural context document + data review

Instruction: complete one template for all documents reviewed including as much of the information as possible. Add as many rows as necessary or move to Excel if easier.

1. **Document citation log**

1.1 Citation	**1.2 Country and region of focus**

Annex 1.2: Key Informant 2 (KI2): Mme SESS Bouaye Odile (from women's producer and processing organizations)

1. Key informant information

1.1 Consent to participate in interview (Y/N) If no, terminate interview	OUI	**1.4 Job title**	Présidente de la plateforme Manioc de Dabou
1.2 Name	SESS Bouaye Odile	**1.5 Institution/programme**	Plateforme Manioc de Dabou
1.3 Gender	F	**1.6 Experience regarding the product and/or your organisation**	Productrice et transformatrice de manioc en Attiéké

2. Raw material characteristics

2.1 Pour avoir un attieké de qualité, quelles caractéristiques doivent avoir la matière première?	**2.2 Pour ces caractéristiques, les préférences diffèrent-elles par région, méthode de transformation, groupe ethnique, genre?**	**2.3 Quelles preuves ou expériences qui soutiennent vos déclarations**	**2.4. Quelles sont les 2 ou 3 plus importantes caractéristiques de qualité de la matière première ? (spécifier pour qui et où)**
Manioc de peau blanche Le Yacé		Pratique la transformation du manioc en attiéké depuis l'adolescence en famille	

3. Steps in food processing and preparation

3.1 Quelles sont les étapes de fabrication/préparation de l'attieké?	**3.2 Y a t il des differences dans les caracteristiques de qualité par region , par**	**3.3 3. Quelles sont les caractéristiques physiques, chimiques et de qualité connus**	**3.4 Quelles sont les caractéristiques sensorielles, physiques, chimiques, nutritionnelles de l attieké**	Quelles preuves ou expériences qui soutiennent vos déclarations	**3.4 What are the two or three most important quality characteristics? Specify for who, where etc.**

	methode de fabrication, genre?	**pour chaque étape jusqu'au produit final (attiéké), les préférences des consommateurs ? (ex : apparence, odeur, gout, texture…)**			**Raw material**	**Final product**
1. fermentation	- Le processus de fermentation peut être différent : soit elle se fait dans des sacs en jutes ou dans des bassines -il faut en moyenne 1kg de manioc fermenté pour 10 kg de manioc au broyage.		La quantité de ferment utilisée peut influencer la durée de conservation du produit fini	J'ai expérimenté différentes proportions (quantités) de ferment pour fabrique de l'attiéké. Les quantités de 1Kg, 900g, 800g, 700g de ferment pour 10kg de manioc produisent la même qualité de manioc		
2.melange manioc cru+ ferment						
3.broyage du melange						
4.homogeneisation du melange						
5.obtention de la poudre						

6. vannage et obtention de l abodjaman	La poudre obtenue est vanné en vue d'enlever les fibres. Les grains d'attiéké ne sont pas séparés par taille					
7. Cuisson et conditionement	La semoule fraiche est généralement préparée par la transformatrice elle-même.	le consommateur aime l'attieké de couleur blanc	Au toucher les grains sont fermes			

4. **Other information of note:** Use this space as an opportunity to record findings relevant to other modules such as the gender and socio-economic context (including its influence on preferences) and product demand.

4.1. Gender and socio-cultural context SoK

4.1.1. User dynamics

Question	**Response**	**What evidence or experience do you have that would substantiate this?** (ensure to collect any written evidence or recommendations of information sources)
2.1. Y a-t-il de nouvelles variétés introduites dans le pays ? Quelle était l'expérience de l'adoption de ces variétés ? Y avait-il des différences constatées dans le statut d'adoption au sein de la population ? Décrire. .	Bocou 1, 2, 4, 6 Yavo, Yacé	
2.2. Quelles sont les normes agronomiques et pratiques culturales du manioc (exemple : cultures intercalaires, rotation, séparer les parcelles des hommes des femmes) dans le pays ?	Planter 1m ente les lignes et sur les lignes pour faciliter le sarclage	

2.3. Quels sont les usages et produits dérivés du manioc?	Placali, congondé, placai-d'attiéké	
2.4. Pour chaque produit issu de manioc, quelle main d'œuvre est impliquée dans les activités au niveau de la production, de la transformation/préparation, de la commercialisation, de la consommation ? (examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)	La main d'œuvre est essentiellement familiale ou en coopérative	
2.5. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les femmes?	La plupart des activités, depuis la production de manioc jusqu'à l'obtention de l'attiéké, est menée par les femmes.	
2.6. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les femmes?	Les hommes interviennent souvent au niveau de la récolte pour aider à déterrer les gros tubercules et au niveau du labour	
2.7. En général, pour chaque utilisation du manioc (produits), qui tire bénéfice de la production, de la transformation/préparation, la vente et la consommation ? (examiner la question suivante l'âge, le genre, origine ethnique, la classe sociale, etc.)		
2.8. Quelles sont les ressources nécessaires à la production, la transformation/préparation, à la vente, la consommation du manioc /attiéké. (terre, crédit, matériel, les intrants …) ? Y a-t-il différents niveaux d'accès à ces ressources pour certains groupes ? Décrire	La terre est nécessaire pour la production de manioc. Chez nous à Dabou, la femme n'hérite pas de la terre. Pour la production, les femmes peuvent se constituer en groupement et s'adresser à la chefferie du village pour l'acquisition de terre. C'est la chefferie qui décide de la quantité de terre à mettre à disposition des femmes.	
2.9. Quelles sont les normes, les croyances et perceptions qui sous-tendent 4, 5, 6,7, 8 ?		
2.10. Avez-vous notez une sorte de compétition /compromis dans les différents usages que l'on peut faire du manioc ? Cela affecte-t-il la		

participation des différents groupes et leur bénéfice tiré du manioc/attiéké		
2.11. Existe-t-il des lois, politiques, instituions (groupe de producteurs/ transformateurs) qui influencent comment est utilisé le manioc, où il est utilisé et qui l'utilise ? Cela affecte-t-il la participation et le bénéfice de certains groupes ?		
2.12. En rapport avec l'attiéké et selon le genre, quels sont les contraintes et opportunités des hommes, des femmes et groupes sociaux ?		

2.13. Template: gender and socio-cultural context document + data review

Instruction: complete one template for all documents reviewed including as much of the information as possible. Add as many rows as necessary or move to Excel if easier.

3. **Document citation log**

1.1 Citation	**1.2 Country and region of focus**

Annex 1.3: Key Informant 3 (KI3): M. ALLOU Couhoule Serge (Head of department from Ministry of agriculture)

1. Key informant information

1.1 Consent to participate in interview (Y/N) If no, terminate interview	Oui	**1.4 Job title**	Chef de Service au MINADER Côte d'Ivoire
1.2 Name	ALLOU Couhoule Serge	**1.5 Institution/programme**	
1.3 Gender	M	**1.6 Experience regarding the product and/or your organisation**	4 ans travaux sur la transformation et la qualité de l'attieké (Projet VLIR)

2. Raw material characteristics

2.1 Pour avoir un attiéké de qualité, quelles caractéristiques doivent avoir la matière première?	**2.2 Pour ces caractéristiques, les préférences diffèrent-elles par région, méthode de transformation, groupe ethnique, genre?**	**2.3 Quelles preuves ou expériences qui soutiennent vos déclarations**	**2.4 What are the two or three most important quality characteristics? Specify for who, where etc.**
Tout type de manioc peut donner de l'attiéké de qualité Le manioc peau blanc (Yacé) est donne un attiéké aussi bon que celui du manioc a peau rose		Je l'ai expérimenté en Guinée, où nous avons produit de l'attiéké de meilleure qualité, à partir de manioc dit non adapté à la fabrication de l'attiéké, en modifiant certains aspects dans le processus de fabrication.	

3. **Steps in food processing and preparation**

3.1 Quelles sont les étapes de fabrication/préparation de l'attiéké?	**3.2 Y a-t-il des différences dans les caractéristiques de qualité par region , par methode de fabrication, genre?**	**3.3 Quelles sont les caracteristiques physiques, chimiques et de qualité connu pour chaque etape jusqu'au produit finial, preference des consommateurs**	**3.4 Quelles sont les caracteristiques sensorielles, physiques,chimiques, nutritionnelles de l'attieké**	Quelles preuves ou expériences qui soutiennent vos déclarations	**3.4 What are the two or three most important quality characteristics? Specify for who, where etc.**	
					Raw material	**Final product**
1.fermentation	Oui la différence est perçue par la méthode de conservation du ''magnan'' le ferment. Certaines femmes le conservent dans des sacs en jute, d'autres dans des pots recouverts par des bassines. Pour obtenir le magnan on précuit le manioc en le mettant à bouillir					

	dans de l'eau ou on braise le manioc					
2. Semoulage						
3. tamisage						
4. séchage/déshydrogénation						
5. cuisson		Le bon attiéké caractérisé par une couleur blanche ou jaune Claire -Sans fibre -Sans sable -gel assez consistant	-un goût légèrement sucré			

4. **Other information of note:** Use this space as an opportunity to record findings relevant to other modules such as the gender and socio-economic context (including its influence on preferences) and product demand.

4.1. Gender and socio-cultural context

2. User dynamics

Question	**Réponse**	**What evidence or experience do you have that would substantiate this?** (ensure to collect any written evidence or recommendations of information sources)
2.1. Y a-t-il de nouvelles variétés introduites dans le pays ? Quelle était l'expérience de l'adoption de ces variétés ? Y avait-il des différences constatées dans le statut d'adoption au sein de la population ? Décrire.	Les variétés Yacé, Yavo, Bocou. Les variétés améliorées Bocou sont moins adoptés. Les transformatrices trouvent qu'elles ne produisent pas un bon attiéké. Cependant, des expériences	

	chiffrées montrent que le Bocou et les autres maniocs donnent tous le même attiéké avec les mêmes qualités organoleptiques et sensorielles identiques.	
2.2. Quelles sont les normes agronomiques et pratiques culturales du manioc (exemple : cultures intercalaires, rotation, séparer les parcelles des hommes des femmes) dans le pays ?		
2.3. Quels sont les usages et produits dérivés du manioc?	Le placali, les cossettes, l'attiéké, l'atoukpou	
2.4. Pour chaque produit issu de manioc, quelle main d'œuvre est impliquée dans les activités au niveau de la production, de la transformation/préparation, de la commercialisation, de la consommation ? (examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)		
2.5. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les femmes?	La transformation la production et la vente du produit fini.	
2.6. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les hommes?	Le transport du manioc et les taches physiques	
2.7 En général, pour chaque utilisation du manioc (produits), qui tire bénéfice de la production, de la transformation/préparation, la vente et la consommation ? (examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)	Les informations sont dans le rapport final de « l'analyse de chaîne de valeur du manioc en Côte d'Ivoire »	
2.8 Quelles sont les ressources nécessaires à la production, la transformation/préparation, à la vente, la consommation du manioc /attiéké. (terre, crédit, matériel, les intrants …) ? Y a-t-il différents niveaux d'accès à ces ressources pour certains groupes ? Décrire		

2.9 Quelles sont les ressources nécessaires à la production, la transformation/préparation, à la vente, la consommation du manioc /attiéké. (terre, crédit, matériel, les intrants …) ? Y a-t-il différents niveaux d'accès à ces ressources pour certains groupes ? Décrire		
2.10 Avez-vous notez une sorte de compétition /compromis dans les différents usages que l'on peut faire du manioc ? Cela affecte-t-il la participation des différents groupes et leur bénéfice tiré du manioc/attiéké		
2.11 Existe-t-il des lois, politiques, instituions (groupe de producteurs/ transformateurs) qui influencent comment est utilisé le manioc, où il est utilisé et qui l'utilise ? Cela affecte-t-il la participation et le bénéfice de certains groupes ?	Le MINADER projette d'organiser et d'institutionnaliser la filière manioc en Côte d'Ivoire. Le MINADER, dans le cadre du 11e FED mettra en œuvre un projet pour le développement du Manioc et des maraîchers. Une cellule Genre au MINADER veille à intégrer l'aspect genre dans tous les projets.	
2.12 En rapport avec l'attiéké et selon le genre, quels sont les contraintes et opportunités des hommes, des femmes et groupes sociaux ?		

4.2. Template: gender and socio-cultural context document + data review

Instruction: complete one template for all documents reviewed including as much of the information as possible. Add as many rows as necessary or move to Excel if easier.

4.2.1. Document citation log

1.1 Citation	1.2 Country and region of focus

Annex 1.4: Key Informant 4 (KI43): Dr Charlemagne NINDJIN (Researcher from Centre Suisse de Recherches Scientifiques)

1. Y a-t-il de nouvelles variétés introduites dans le pays ? Quelle était l'expérience de l'adoption de ces variétés ? Y avait-il des différences constatées dans le statut d'adoption au sein de la population ? Décrire.

   La production de manioc est une activité culturelle. Il y a des formes de justifications des pratiques et connaissances qui sous-tendent sa production. Dans la zone d'Abidjan les variétés de manioc produites sont construites comme étant des variétés anciennes. Anciennes, parce que ces variétés n'ont pas un rendement important et leur production ne suit pas une technique culturale structurée ou particulière. Elles sont produites de manière traditionnelle. Les autochtones ayant pour aliment de base l'attiéké, justifient la production de ces variétés par le fait qu'elles produisent le meilleur attiéké. Donc pour ces derniers pour avoir l'attiéké de qualité il faut le faire avec les variétés traditionnelles ou anciennes de manioc. A Abidjan et ses environs, plus grande zone de consommation de racine fraîche de manioc, les variétés ''anciennes'' dominent toujours la production d'attiéké. Voici quelques variétés qu'elles construisent comme étant traditionnelle : Yacé, Bonoua…Cela a été constaté lors de la pénurie de manioc entre fin 2015 et début 2016 lorsque selon les productrices d'attiéké au moment où le prix d'un véhicule bâché chargé de variété yacé était à 300.000 francs celui d'une variété améliorée qu'elles appellent Chikaya était à 180.000 francs **(Mobio *et al*, 2017)**. En outre, il y a la série de variétés Bocou à haut rendement développée par le Centre National de Recherche Agronomique, notamment le Bocou 1 qui connait la plus large adoption auprès des agriculteurs.

2. Quelles sont les normes agronomiques et pratiques culturales du manioc (exemple : cultures intercalaires, rotation, séparer les parcelles des hommes des femmes) dans le pays ?

Dans la plupart des cas les champs de manioc sont des propriétés du ménage. Le chef de ménage (homme) défriche la parcelle, fais le planting et confie la gestion des autres activités à la femme jusqu'à la récolte, car les champs ont un double objectif : autosuffisance du ménage et la vente. Et comme dans la division sociale des tâches c'est la femme qui s'occupe de tout ce qui est nourriture dans le ménage, c'est une manière de lui confier la gestion des ressources alimentaires du ménage en lui confiant la gestion des champs de manioc. Le manioc étant rustique et moins exigeant en fertilité du sol est planté après une seconde précédente culture dans un système de rotation, jachère, avec brûlis sans utilisation d'engrais particulier.

3. Quels sont les usages et produits dérivés du manioc ?

La plupart du manioc produit en Côte d'Ivoire est destiné à la production de l'attiéké et le placali.

4. Pour chaque produit issu de manioc, quelle main d'œuvre est impliquée dans les activités au niveau de la production, de la transformation/préparation, de la commercialisation, de la consommation ? (Examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)

La production du manioc est dominée dans la zone d'Abidjan (Abidjan et ses alentours) par les allochtones. Or l'accès à la terre de ces acteurs pose problème. Ce qui limitent leur moyen de production. Dans la production du manioc la main d'œuvre se fait rare et devient de plus en plus en chère.
Production d'Attiéké : la main d'œuvre est essentiellement familiale dans le Sud notamment à Abidjan et ses alentours. Cette main-d'œuvre est dominée par le genre féminin de classe sociale moyenne dont l'âge minimum est de 18 ans. Les peuples du Sud (Ebrié, Adjoukrou, Alladjan…) c'est à Abidjan et ses environs sont dominants dans la production d'attiéké **(Projet FIRCA-IG, 2015)**.
Commercialisation de l'attiéké : la plupart des commerçantes grossistes sont les ethnies autochtones d'Abidjan et ses alentours. Quant aux vendeuses détaillantes elles sont de toutes ethnies. Cette activité est dominée par la gente féminine dont l'âge est compris entre 20 ans et 40 et plus. Elles ont pour la plupart le niveau primaire et secondaire et sont de classe sociale moyenne ***(*Nindjin *et al., 2017).***
Commercialisation placali frais *:* la plupart du placali frais est produit par les femmes des zones productrices de manioc de l'intérieur du pays (Oumé, Divo, Gagnoa, Bouaké, Toumodi…).
Commercialisation placali prêt à la consommation : dans la plupart des cas, ce sont les femmes baoulés qui dominent dans ce secteur de commerce.
La consommation : toute la population ivoirienne est consommatrice de l'attiéké et du placali avec une prédominance des consommateurs des classes sociales populaires et moyennes.

5. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les femmes ?

Les activités dominées par les femmes sont : la transformation et la vente de l'attiéké et du placali.

6. Selon l'utilisation du manioc, quelles sont les activités qui sont dominées par les hommes ?

Le transport est dominé par les hommes, la production du manioc également.

7. En général, pour chaque utilisation du manioc (produits), qui tire bénéfice de la production, de la transformation/préparation, la vente et la consommation ? (examiner la question suivant l'âge, le genre, origine ethnique, la classe sociale, etc.)

Production : hommes
Transformation : femmes
Vente : femmes

Consommation : toute la population de Côte d'Ivoire

8. Quelles sont les ressources nécessaires à la production, la transformation/préparation, à la vente, la consommation du manioc /attiéké. (terre, crédit, matériel, les intrants …) ? Y a-t-il différents niveaux d'accès à ces ressources pour certains groupes ? Décrire

   Pour la production du manioc : il faut la terre et ce sont les hommes qui ont plus accès à la terre que les femmes.

   Pour la transformation et la vente : les femmes n'ont pas accès aux crédits car leur activité est construite comme une activité du secteur informel.

9. Quelles sont les normes, les croyances et perceptions qui sous-tendent 4, 5, 6,7, 8 ?

Pour 4 : à Abidjan et ses alentours, la production de manioc en tant qu'activité économique est majoritairement assurée par les allochtones. Cette situation s'explique par le fait que la production du manioc est une activité sociale qui est perçue par les autochtones comme étant destiné à la consommation familiale. Ils produisent le manioc en fonction de leur habitude alimentaire. Comme ils construisent l'attiéké comme leur aliment de base, alors ces acteurs produisent le manioc essentiellement pour faire l'attiéké. Cela se traduit par l'existence dans chaque famille d'un champ de manioc pour assurer l'alimentation du ménage. Contrairement à cette perception de la production du manioc, les allochtones de ces zones essentiellement constituées de ressortissant Burkinabé et Malien produisent le manioc pour la vente pour non seulement occuper leurs femmes mais aussi pour accroitre leur revenu, car la plupart d'entre eux sont des ouvriers ou manœuvre dans les plantations d'hévéa, palmier à huile ou d'ananas.
Pour 5, 7 : La transformation du manioc est dominée par les femmes parce qu'à l'origine l'activité était destinée à la consommation du ménage. Et comme dans la division sociale des tâches ce sont les femmes qui s'occupent de la nourriture dans le ménage elles le faisaient non seulement pour subvenir aux besoins alimentaires du ménage, puis vendaient le supplément pour couvrir les autres charges annexes concernant la cuisine.
Dans certains peuples comme les Ebriés, et Avikam la production d'attiéké est une activité sociale qui participe à la construction du statut social de la femme. En effet, chez ces populations lorsqu'une femme ne sait pas faire de l'attiéké elle est construite comme étant immature qui a subi une mauvaise socialisation. Par conséquent pour ces peuples cette dernière n'est pas apte à tenir un foyer. Cette situation est vécue comme une honte pour sa famille. Dans ces sociétés l'activités est exclusivement aux femmes. Donc pour ces sociétés la production d'attiéké permet de mesurer le niveau de maturité de la femme et de sa capacité à tenir un foyer.
Pour 6, 7: les hommes dominent la production du manioc parce que la terre qui est le premier moyen de production est un bien familiale dont la gestion est réservée aux hommes. Ainsi ces derniers déterminent la gestion de ce bien. Ce sont eux qui décident ce qu'on doit faire sur ces terres et comment on doit le faire. Par conséquent les femmes pour avoir accès a ce bien sont obligées de faire des demandes auprès des hommes, ce qui limite leur mage de manœuvre dans la production de manioc **(Mobio, 2017).**

10. Avez-vous noté une sorte de compétition /compromis dans les différents usages que l'on peut faire du manioc ? Cela affecte-t-il la participation des différents groupes et leur bénéfice tiré du manioc/attiéké

Oui, le produit attiéké est fortement concurrencé par le placali (pâte gélifiée de manioc) qui est moins fastidieux, à travers l'orientation de la matière première vers la fabrication de pâte fermentée de manioc qui est fortement exportée pour la fabrication du placali et consommée également au niveau national. Cela peut contribuer à des pénuries d'attiéké et renchérir les prix (**Gbezo et al., 2017)**. En outre, le fait d'être tributaire d'une activité transversale et multisectorielle telle que le transport, le secteur du manioc/attiéké peut rencontrer le manque de disponibilité de véhicule ou des hausses de prix des voyages qui influencent le prix au consommateur (**Gbezo et al., 2017 ; Nindjin et al., 2017)**.

11. Existe-t-il des lois, politiques, institutions (groupe de producteurs/ transformateurs) qui influencent comment est utilisé le manioc, où il est utilisé et qui l'utilise ? Cela affecte-t-il la participation et le bénéfice de certains groupes ?

Non

12. En rapport avec l'attiéké et selon le genre, quels sont les contraintes et opportunités des hommes, des femmes et groupes sociaux ?

Contraintes : les productrices supportent les pertes post- production, elles subissent les contraintes liées à la production du manioc (matière première très périssable : 1-2 j) et à la vente de l'attiéké (produit périssable : 3-7 j). En outre, elles ne maitrisent pas l'évolution du marché. Dans cette chaîne, les productrices sont les plus impactées par la dynamique de l'offre et de la demande sur le marché. Une autre contrainte est liée au manque de coordination entre les différents acteurs de la chaîne de valeur attiéké (absence d'inclusion de chaîne de valeur) (**Nindjin et al., 2017)**. Dans la filière Manioc, les relations entre les acteurs des différents maillons restent faibles et accentuent l'inefficacité du secteur, affectant ainsi la rentabilité des échanges. En effet, pendant que les producteurs et transformateurs représentant l'offre recherchent des débouchés attractifs et prometteurs pour leurs produits, les acheteurs se plaignent de l'atomisation et du manque de fiabilité, de consistance et de stabilité de l'offre des produits (**Nindjin et al., 2017)**. Les consommateurs représentant la demande ont des exigences de qualité qui ne rencontrent pas toujours leur satisfaction (**Nindjin et al., 2017)**. Les aléas climatiques et la faible maitrise des techniques agricoles efficientes ne facilitent pas toujours de planifier une production. Les rendements théoriques sont souvent différents des rendements observés. Cela crée des gaps qui faussent la prévision. L'innovation n'est pas toujours disponible. Malgré la création par l'Etat de l'Institut de Technologie tropicale (I2T), le besoin de machine est toujours criard sur le territoire.

Opportunités : la mise en coopérative des productrices d'attiéké peut favoriser l'accroissement de leur revenu et réduire la pénibilité de leur tâche en mutualisant les efforts individuels (**Nindjin et al., 2017)**. Cependant, le potentiel du marché pour **les vendeuses individuelles et les coopératives** n'est pas toujours reluisante (**Nindjin et al., 2017)**. Elles ne conçoivent pas un avenir radieux sans une aide Etatique et sans l'utilisation de machines. Ce pessimisme met en

danger la plus-value de l'activité traditionnelle qui est le savoir-faire technique artisanal et ancestral. En effet, la technologie des machines implique une standardisation des pratiques et techniques et une égalisation, voire une diminution des prix.

Pour les **vendeurs de Garba** et **les restaurants/ Maquis**, l'avenir de l'attiéké n'est pas compromis car en tant que nourriture, l'attiéké a gagné en hégémonie dans l'alimentation des ivoiriens (**Nindjin et al., 2017)**. L'Homme 1 attire notre attention sur le fait que : *« Maintenant **si quelqu'un n'a pas mangé Attiéké là, il n'est pas content** »*. Pour eux, le potentiel de marché existe mais il est limité par plusieurs facteurs comme : le pouvoir d'achat des clients et le coût de plus en plus élevé du produit. A cela s'ajoute la hausse du prix du poisson. Le capital est insuffisant dans son allocation entre attiéké et poisson.

Pour **les entreprises**, le potentiel du marché est grand. Cela s'explique par la conjugaison de deux facteurs : l'élargissement des débouchés (vers de nouveaux marchés) et le prolongement de la durée de conservation. Les entreprises avec l'utilisation de machines ont une production plus grande que celle que nous proposent les méthodes traditionnelles. Cependant, cette production semble insuffisante face à une demande de plus en plus croissante. Pour faire face à la croissance de la demande, les entreprises doivent accroitre leur capacité. L'entreprise 1 nous a livré son plan de production en ces termes : *« Actuellement nous sommes à 4 tonnes mois, mais à partir du mois d'Août nous allons passer au double, à **8 tonnes** et jusqu'en, en 2018, nous allons passer à **24 tonnes** mois»* (**Nindjin et al., 2017)**. A cela s'ajoute l'intérêt des supermarchés qui sont de plus en plus nombreux sur le territoire. L'aspect financier n'est plus un tabou dans le secteur des entreprises de production d'attiéké. Les entreprises demandent que les banques s'intéressent à elles, ce qui tarde à venir malgré le potentiel du secteur. Pour ce faire, elles proposent des cadres de concertations pour résoudre la question du financement : *« **On peut créer une vraie coopérative** dans laquelle se font des échanges marchands et des investissements pour structurer la production, la transformation et la commercialisation de sorte à avoir un fond consistant et aviser **une banque pour nous financer** afin de développer le manioc et créer de la richesse et des emplois »* (**Nindjin et al., 2017)**.

L'attiéké frais a montré des limites de conservation prolongée. En revanche, l'attiéké déshydraté permet une conservation de longues durées avec une réduction des pertes post production. A la réduction des pertes liées à la conservation, on peut adjoindre la possibilité de négociation. En effet, les entreprises ne sont pas soumises à des pressions sur le stock existant.

13. **Document citation log**

5.1 Citation	**5.2 Country and region of focus**
Gbezo A. S. ; Kouassi K. B. ; Amanzou N. A. A. ; Mobio A. J. ; Kouakou K. P. ; Yobouet B. A. ; Dao D. ; Bonfoh B. (2017), « Crise du Manioc et de ses Produits Dérivés en Côte d'Ivoire : Compréhension et Options de Développement ». *Rapport interne CSRS.*	Côte d'Ivoire
Amanzou N. A. A. (2014), « Consentement à payer de l'attieke de Côte d'Ivoire : cas des départements de Grand-Lahou, Jacqueville, Dabou, Abidjan et Yamoussoukro ». *Mémoire de master 2, UFR des sciences économiques et développement, Université Alassane Ouattara*.	Côte d'Ivoire, Départements de Grand-Lahou, Jacqueville, Dabou, Abidjan et Yamoussoukro
Mobio A. J., (2015), « Construction sociale de la qualité de l'attiéké de Grand-Lahou et Dabou en Côte d'Ivoire », mémoire de Master 2, Institut d'Ethnosociologique (IES) Université Félix Houphouët Boigny	Côte d'Ivoire, Département de Grand-Lahou et Dabou
Mobio A. J. ; Fokou G. ; Aka S.; Kouakou P. ; Kouassi K. B. ; Amanzou N. A. A., Dao D. ; Bonfoh B., (2017), « social and ecological drivers of cassava shortage in Côte d'Ivoire », en cours de publication	Côte d'Ivoire
Nindjin C., Amanzou A.A.A., Mobio J., Fort F., Baud G. (2017). Etude de marché de l'attiéké, Côte d'Ivoire. *Projet FAO, Rapport Final d'Activités, Mai-Août 2017*, 60 p.	Côte d'Ivoire
Projet FIRCA-IG (2015). Attiéké de Grand-Lahou: spécificité de la qualité et plan d'actions de valorisation selon la démarche des Indications Géographiques (IG). *Rapport Final, Février 2014-Aout 2015*, 192 p.	Côte d'Ivoire, Département de Grand-Lahou

Annex 1.5: Key Informant 5 (KI5): Dr N'zué Boni (Researcher from Centre National de Recherche Agronomique de Côte d'Ivoire)

1. **Key informant information**

1.1 Consent to participate in interview (Y/N) If no, terminate interview	Oui	**1.4 Job title**	Chercheur
1.2 Name	Dr Nzué Boni	**1.5 Institution/programme**	CNRA / Programme Racines et Tubercules
1.3 Gender	M	**1.6 Experience regarding the product and/or your organisation**	

2. **Raw material characteristics**

2.1 Pour avoir un attieké de qualité, quelles caracteristiques doivent avoir la matiere premiere?	**2.2 Pour ces caracteristiques, les preferences different-elles par region, methode de transformation, groupe ethnique, genre?**	**2.3 Quelles preuves ou experiences qui soutiennent vos declarations**	**2.4 What are the two or three most important quality characteristics? Specify for who, where etc.**

3. **Steps in food processing and preparation**

3.1 Quelles sont les etapes de fabrication/preparation de l'attieké?	**3.2 Y a t il des differences dans les caracteristiques de qualité par region , par methode de fabrication, genre?**	**3.3 Quelles sont les caracteristiques physiques, chimiques et de qualité connu pour chaque etape jusqu'au produit finial, preference**	**3.4 Quelles sont les caracteristiques sensorielles, physiques,chimiques, nutritionnelles de l attieké**	Quelle prevue ou experiences qui soutiennent vos declartions	**3.4 What are the two or three most important quality characteristics? Specify for who, where etc.**

		des consommateurs				
					Raw material	**Final product**

4. **Other information of note:** Use this space as an opportunity to record findings relevant to other modules such as the gender and socio-economic context (including its influence on preferences) and product demand.

4.1. Gender and socio-cultural context SoK

4.1.1. User dynamics

Question	**Response**	**What evidence or experience do you have that would substantiate this?** (ensure to collect any written evidence or recommendations of information sources)
2.1. Y a-t-il de nouvelles variétés introduites dans le pays? quelle était l'expérience de l'adoption de ces variétés? Y avait-il des différences constatées dans le statut d'adoption au sein de la population? Décrire.	Oui, il y a de nouvelles variétés introduites en 2014 en Côte d'Ivoire. Mais ces variétés sont encore en évaluation. L'adoption de telle ou telle variété dépend des objectifs de production et de transformation. En général, les variétés introduites se prêtent à la transformation en attiéké et en placali. Ainsi, les producteurs, qui ont pour aliment de base les deux produits ou qui vendent le manioc à des transformateurs de ces produits, adoptent ces variétés avec un taux d'adoption qui est d'au plus 25 %. Mais lorsque la variété est productive et d'utilisations polyvalentes, le taux d'adoption est supérieur et peut atteindre 30 %.	
2.2. Quelles sont les normes agronomiques et pratiques culturales du manioc dans le pays	Le manioc est souvent cultivé en pure au Sud du pays sur des superficies estimées à moins d'un hectare par des femmes et des hommes. Dans le reste du pays, le manioc est souvent cultivé en association avec l'igname, le riz et le	

	maïs. Le manioc peut être cultivé aussi comme spéculation intercalaire des cultures industrielles de l'hévéa, du palmier à huile, de l'anacarde et du cacao au stade juvénile. La production est pratiquée par les femmes que les hommes. La production du manioc tend à une séparation des parcelles entre les femmes et les hommes.	
2.3. Quels sont les usages et produits dérives du manioc?	Le manioc est autoconsommé et commercialisé localement, dans la sous-région ouest-africaine et en Europe. Il a été recensé en Côte d'Ivoire plus de 20 produits dérivés. Mais les plus fréquents sont : l'attiéké, le placali, le foutou, le toh, la farine, l'amidon et le gari.	
2.4. Pour chaque produit issu de manioc, quelle main d'œuvre est impliquée dans les activités au niveau de la production, de la transformation/préparation, de la commercialisation de la consommation?		
2.5. Selon l'utilisation du manioc quelles sont les secteurs qui sont dominées par les femmes?	Les femmes sont dominantes au niveau de la transformation et de la commercialisation où les proportions de femmes peuvent atteindre 80 %. Au niveau de la production, la proportion peut atteindre 60 %.	
2.6. Selon l'utilisation du manioc quelles sont les secteurs qui sont dominées par les hommes?	Aucune activité (production, transformation et commercialisation) n'est dominée par les hommes. Seul le transport des produits du manioc est dominé par les hommes	
2.7. En général, pour chaque utilisation du manioc, qui tire bénéfice de la production, de la transformation/préparation a la vente et la consommation		
2.8. Quelles sont les ressources nécessaires à la production, la transformation/préparation, à la vente, la consommation du manioc/attieké. Y a-t-il différents niveaux d'accès à ces ressources pour certains groups? Décrire		
2.9. Quelles sont les normes, les croyances et perception qui sous-entend 4, 5, 6 ?	Le manioc est une culture vivrière dans la conception collective. Ainsi, l'on destine sa production, sa	

	transformation et sa commercialisation aux femmes. Mais, avec la dimension commerciale que prend le manioc, de plus en plus, les hommes s'adonnent à la production. La transformation et la commercialisation demeurent la propriété des femmes.	
2.10. Avez-vous notez une sorte de compétition/compromise dans les différent usages que faire du manioc? Cela affecte t-il la participation des différents groupes et leur bénéfice tire du manioc/attieké?	Non	
2.11. Existe-t-il des lois, politiques, institutions (groupe de producteurs/transformateurs) qui influencent comment est utilisé le manioc, ou il est utilisé et qui l'utilise? Cela affecte-t-il la participation et le bénéfice de certains groupes?	Non, il en n'existe pas.	
2.12. En rapport avec l'attieké et selon le genre, quelles sont les contraintes et opportunités des homes, des femmes et groupes sociaux?		

4.2. Template: gender and socio-cultural context document + data review
Instruction: complete one template for all documents reviewed including as much of the information as possible. Add as many rows as necessary or move to Excel if easier.

4.2.1. Document citation log

1.1 Citation	1.2 Country and region of focus

2.8.2. **Annex 2**: Document citation log

1. Citation	2. Country and region of focus
Doumbia S., Aman S. A., N'zué B., Djédji C., (2009). Études d'impact ex-ante de nouvelles technologies du manioc en Côte d'Ivoire. Etude 1 : trois technologies du manioc dans le département de Dabou (Sud Côte d'Ivoire). Rapport de l'étude, 27p + annexes	Côte d'Ivoire, Department of Dabou (south of Côte d'Ivoire)
Mobio A. J., (2015), « Construction sociale de la qualité de l'attiéké de Grand-Lahou et Dabou en Côte d'Ivoire », mémoire de Master 2, Institut d'Ethnosociologique (IES) Université Félix Houphouët Boigny	Côte d'Ivoire, Departments of Dabou and Grand-Lahou (south of Côte d'Ivoire)
Projet FIRCA-IG (2015). Attiéké de Grand-Lahou: spécificité de la qualité et plan d'actions de valorisation selon la démarche des Indications Géographiques (IG). *Rapport Final, Février 2014-Aout 2015*, 192 p.	Côte d'Ivoire, Department of Grand-Lahou (south of Côte d'Ivoire)
Gbezo A. S. ; Kouassi K. B. ; Amanzou N. A. A. ; Mobio A. J. ; Kouakou K. P. ; Yobouet B. A. ; Dao D. ; Bonfoh B. (2017), « Crise du Manioc et de ses Produits Dérivés en Côte d'Ivoire : Compréhension et Options de Développement ». *Rapport interne CSRS.*	Côte d'Ivoire
Nindjin C., Amanzou A.A.A., Mobio J., Fort F., Baud G. (2017). Etude de marché de l'attiéké, Côte d'Ivoire. *Projet FAO, Rapport Final d'Activités, Mai-Août 2017*, 60 p.	Côte d'Ivoire
Mobio A. J. ; Fokou G. ; Aka S.; Kouakou P. ; Kouassi K. B. ; Amanzou N. A. A., Dao D. ; Bonfoh B., (2017). « Social and ecological drivers of cassava shortage in Côte d'Ivoire », en cours de publication	Côte d'Ivoire
Nindjin C., Amanzou A.A.A., Mobio J., Fort F., Baud G. (2017). Etude de marché de l'attiéké, Côte d'Ivoire. *Projet FAO, Rapport Final d'Activités, Mai-Août 2017*, 60 p.	Côte d'Ivoire
Mendez del Villar, P., Adaye, A., Tran, T., Allagba, K., Bancal, V. 2017. Analyse de la chaîne de Manioc en Côte d'Ivoire. Rapport pour l'Union Européenne, DG-DEVCO. Value Chain; Analysis for Development Project (VCA4D CTR 2016/375-804), 157p + annexes.	Côte d'Ivoire, Région du Centre (Toumodi, Bouaké et Yamoussoukro), au Nord du pays (Korogho), au Centre Ouest, (Daloa et Duékoué), dans la région Sud (Abidjan et Bassam) et Sud-est (Adzopé, Bonoua, Aboisso et Affiénou)
VCA4D, 2018 : La chaîne de valeur manioc en Côte d'Ivoire. Value Chaine Analysis for Development, VCA4D, n°2, janvier 2018. Commission européenne, 6p.	Côte d'Ivoire

Perrin A., Ricau P., Rabany C., (2015). Etude de la filière Manioc en Côte d'Ivoire Projet « Promotion et commercialisation de la Banane Plantain et du Manioc en Côte d'Ivoire » financé par le Comité Français pour la Solidarité Internationale (CFSI), 84p + Annexes	Côte d'Ivoire

2.8.3. **Annex 3**: Document review

Source (first author, year)	Methodology			User dynamics											Comment on your level of confidence in the paper
	Focus groups Sex disaggregated data presented (y/n), Specify: number, gender, region, or other user groups	**Individual interviews Sex disaggregated data presented (y/n)**, Specify: number, gender, region, or other user groups	**Ethnography, Participant observation, Participatory Varietal Selection, Participatory Rural Appraisal Other:** Describe	**Agronomic practices and past experiences of adoption relevant to the product**	**Use of crop (for each use, add a row)**	**Who is involved in the production, processing and sale of the product**	**Who benefits from the production, processing and sale of the product**	**What are the uses primarily under women's control (W) and men's control (M)**	**What resources are required for the production, processing and sale of the product**	**What are the differences in levels of access to resources for certain groups**	**Beliefs and perceptions, policies and laws, that influence practices associated with the crop and product and levels of access to resources for the crop and product**	**Possible trade-offs for people in use of the crop and benefits**	**Gender based constraints**	**Gender based opportunities**	
Doumbia, 2009	Village leaders, producers, processors	Producers, processors, sellers	Participatory rural appraisal, individual interview												

3. ATTIÉKÉ DEMAND IN CÔTE D'IVOIRE

3.1. Key findings

- Attieke, the product of focus for this paper, is a fermented cassava semolina cooked with steam. There are three variations: Garba (low-end, not sieved), Attiéké, and Abodjama (high-quality). The differences are due to the presence of fibers, the cooking steps and the particle size of the attiéké, which influences perceptions of quality.
- The south of Ivory coast has the largest cassava production and Attieke processing markets; which tend to concentration around large urban centers: Yamoussoukro and Bouake (Ccentre), Daloa (Ccentral west), Duékoué (Wwest), San Pedro (Ssouth West), Abidjan (South East).
- Cassava production has increased 2.08 million tonnes in 2001 to 5.08 million tonnes in 2015 and 4.5 million tonnes in 2016
- Cassava is typically grown on plots less than one hectare. In the south it is monocropped and intercropped in the rest of the country.
- Abidjan is the largest market, with garba about 50% of the market because it is quick to make and often fills the gab with Attieke isn't available.
- two segments of attiéké demand: local sales by residents and highly competitive international sales. In the local segment, production is carried out by nationals and non-nationals and is exclusively manual and carried out by women.
- Processing is carried out at local level in villages, who sell to wholesalers, semi-wholesalers or retailers. Attiéké is alomanufactured in urban areas, the roots can be purchased directly by wholesalers who sell to processing units or processing units buy roots directly from producers, but always on the order of wholesalers and / or exporters.
- The national consumption of attiéké is approximately between 100-110 kg/capita in 2016. National consumption of attiéké is estimated at 2.475 million tonnes of fresh cassava equivalent.
- the local market is the dominant market in terms of total revenue. However, consumers are increasingly demanding about quality and hygiene around the product
- Studies have differed in how the Attieke value chain is described. One example from a study are: 1) Producers, who are mainly women; 2) Carriers/transporters who transport by vehicle; 3) Processors who are mainly independent women or women organized into cooperatives; 4) Some industrial or semi-industrial units managed by men; 5) Wholesalers, 6) Retailers, 7) Caterers; 8) Traders from Niger(Haoussa), 9) Exporters

3.2. Objective

The aim of the Demand SoK (State of Knowledge report) is to understand the demand for the product, drawing on Segmenting-Targeting-Positioning (STP) Framework. The objectives are to identify different demand segments for the product, define who and where the demand for the product is, and the characteristics associated with preferences for the product. Importantly, a demand segment includes consumers who pay money for the product and those who may grow the crop and prepare the product at home for family consumption.

3.3. Research Questions

The research questions for the demand module are:

1. What is the demand and trends in demand for the product, from people who pay for the product and make and consume it themselves?
    a. What are the different demand segments associated with the product?

   b. What are the size of the different demand segments and what are the trends for the product?
   c. What are the geographical and demographic characteristics of the demand segments for the product?
2. How do the demand segments correspond to preferred characteristics for the product?
3. How the product is transported, stored and sold, and by who (e.g. gender, socio-economic status, age, region etc.)?

3.4. Methodology

3.4.1. Sampling and data collection method

Information collected was obtained from interviews with key informants. The latter were selected because of their proven experience in cassava and attiéké. They are mainly researchers, officers of the Ministry of Agriculture, actors of the value chain of attiéké. Each key informant was interviewed on the three domains and they were asked to answer to the best of their knowledge. Most of the data was collected face-to-face, and some key informants preferred to reply to questions by email.

Scientific articles and reports of studies related to attiéké were also consulted.

3.4.2. Data Analysis

Data were analyzed by comparing the information obtained from the key informants with the information contained in the various articles and reports. This information was then synthesized to provide answers to the different research questions.

3.4.3. Narrative summary

In this first phase of our preliminary study we interviewed 05 key informants.

Scale of cassava production, and seasonality, associated with attiéké

Cassava is grown throughout the country with a predominance in forest areas with higher rainfall. Production is lower in the Sahel region, in the north of the country (Korhogo), where the climate is less favorable. Thus, the more one goes south, the production tends to increase with concentrations around large urban centers: Yamoussoukro and Bouake (Centre), Daloa (Central west), Duékoué (West), San Pedro (South West), Abidjan (South East). The figure below shows the main cassava production areas in Ivory Coast (Perrin et al., 2015).

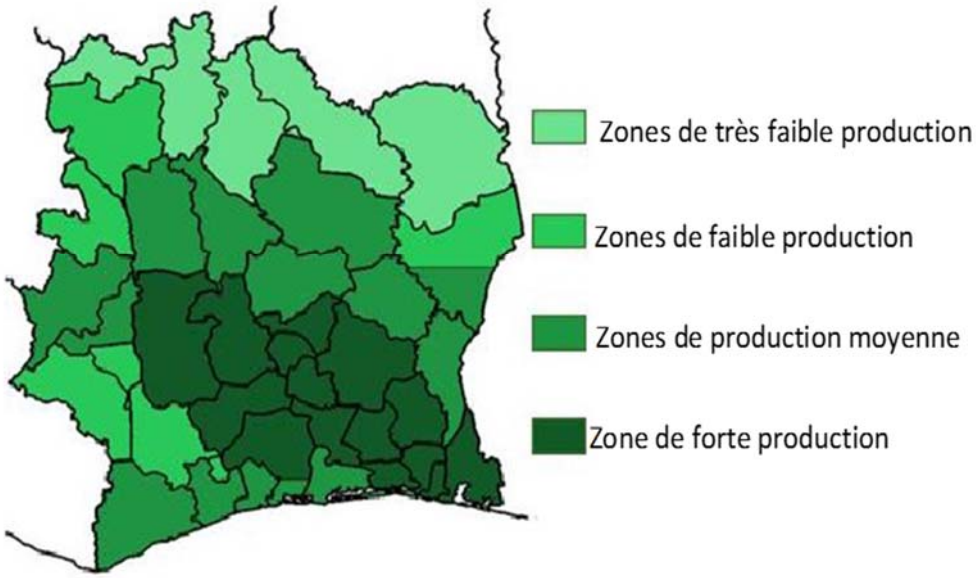

Figure 1 : Production zones of cassava in Côte d'Ivoire

Source: Rongead (2015)

According to Dr Nindjin, a Scientist from the University of Félix Houphouet Boigny, who was interviewed as a key informant for this study, there are no updated statistics by region or locality. The general trend of cassava users in Abidjan for attiéké production indicate that areas of high cassava collection are: South Comoé (Bonoua, Aboisso, Alépé), Central (Toumodi, Yamoussoukro, Bouaké), and the Western region (Man, Duékoué, etc) is the new collection area.

Dr N'Zué Bony, a Scientist from the National Centre for Agricultural Research states that cassava is often grown in monocropping in the South of the country on areas estimated at less than one hectare by women and men. In the rest of the country, cassava is often grown in association with yams, rice and maize. Cassava can also be grown as an intercrop on plots of rubber, oil palm, cashew and juvenile cocoa.

The volume of production is increasing. According to the Food and Agriculture Organization of the United Nations (FAO) and the Ministry of Agriculture and Rural Development (MARD), cassava production increased from 2.08 million tonnes in 2001 to 5.08 million tonnes in 2015 and 4.5 million tonnes in 2016. The average yield in recent years is about 9 tonnes/hectare. This increase in domestic production is due more to land expansion than to higher yields.

Table 1: Cassava production trends, area and yield in Ivory Coast (2001-2016)

	2001	2002	2003	2004	2005	2006	2007	2008
Production (t) '000's	2087	2074	2060	2074	2198	2267	2342	2531
Area (ha) '000's	269	268	266	269	273	309	319	329
Yield (t/Ha)	7.7	7.7	7.8	7.7	8.0	7.3	7.3	7.7
	2009	2010	2011	2012	2013	2014	2015	2016
Production (t) '000's	2262	2307	2359	2412	2436	4239	5087	4548
Area (ha) '000's	339	350	353			510	597	464
Yield (t/Ha)	6.7	6.6	6.7	6.6	6.5	8	8.5	9.8

Source: FAO CountrySTAT- Côte d'Ivoire (2001-2013), MINADER/DGPSP (2014-2016)

According to Perrin et al (2015), depending on the region, the cassava harvest takes place in the coastal area 6 to 12 months after the planting (to avoid the risk of rot in the soil). In forest and savanna areas, the harvest takes place 6 to 18 months after the planting, depending on the needs and to avoid harvesting in the dry season because of labor costs and the difficulty to replant the cuttings.

- ***Variations of the products***

Attiéké is a fermented cassava semolina cooked with steam. Mendez del Villar et al (2017) distinguish three qualities: Garba, Attiéké, and Abodjama. The difference is played out on the presence of fibers and the particle size of the attiéké (calibration of the semolina):

- Garba is considered as a low-end attiéké which, having not been sieved before cooking, retains more of the central fibers of the root. It is intended for the preparation of a popular dish accompanied by fish and sold at low prices in the “garbadromes”. Considered as the dish of the poor, garba is popular even outside of the poorest social classes. The preparation of garba is simpler and less laborious than the standard product. Some steps are shortened or omitted. The semolina is coarse and there is no calibration. Semolina grains are therefore random size. Fermentation of garba is initiated by an inoculum, and it is fermented for one day against a two-day fermentation for attiéké. In addition, less inoculum is added to the fermentation process, only 3% inoculum is used instead of 10% for the production of attiéké. The inoculum difference would also impact on the texture. The garba also contains more red palm oil than the standard or abodjama attiéké. The steaming time is approximately 10 minutes shorter than that for attiéké and ends when the grains become glassy. Garba is then a sticky product with a lot of fibers and a more acidic taste.
- The standard attiéké is the product of a series of unit operations: washing, peeling, grinding, lactic fermentation (using a traditional starter, the “mangnan”), pressing, semoling, partial sun drying, sieving (fiber removal), and steaming.
- Abodjama (high quality attiéké) is prepared like attiéké, but with a grain calibration through sieves with increasingly finer mesh sizes to produce lots whose grains have a homogeneous diameter: abodjama of small grain, medium grain, or coarse grain. These sieving steps make it possible to eliminate the residual fibers. The cooking is longer than for garba and is done in two stages. For 10 minutes, the preparation is stewed until the grains are glassy. Then the preparation is stirred and cooked for another 15 minutes

Different demand segments associated with the product

Abidjan alone represents a population of 2.5 million potential consumers. The size of this market makes Abidjan the largest urban consumption center (Assanvo et al., 2002). However, garba, a type of attiéké whose quality is recognized as inferior, represents about 50% of the total production of attiéké marketed in Abidjan (CSRS, 2010). Due to its quickness of the production process and its low price, garba has established itself as the alternative to the lack of supply of attiéké. This new way of producing and the extension of the production process are leading to a new organization of the value chain led by foreign populations from Niger. Garba is more consumed in large cities. Initially, much appreciated by young people, garba is more and more consumed by all age groups because of its great availability and the quickness of its production process. Other types of attiéké are more consumed in their original production area (Dabou, Grand-Lahou, Bingerville, Jacqueville, Abidjan).

Amanzou (2014) defines two segments of attiéké demand: local sales by residents and highly competitive international sales. In the local segment, production is carried out by nationals and non-nationals and is exclusively manual and carried out by women. In the international segment, production is shared between national actors and international actors.

Mendez del Villar et al., (2017) give us more details. The production of attiéké can be done at the community level by individual units or groups of women, or in semi-industrial units (with some equipment) based in urban areas (Figure 2).

When attiéké is made in the village, producers / processors sell to wholesalers, semi-wholesalers, and sometimes to retailers. Producers / processors can also sell directly to local markets.

When attiéké is manufactured in urban areas, the roots can be purchased directly by wholesalers who turn to processing units for service delivery. It is also possible that these processing units buy roots directly from producers, but always on the order of wholesalers and / or exporters.

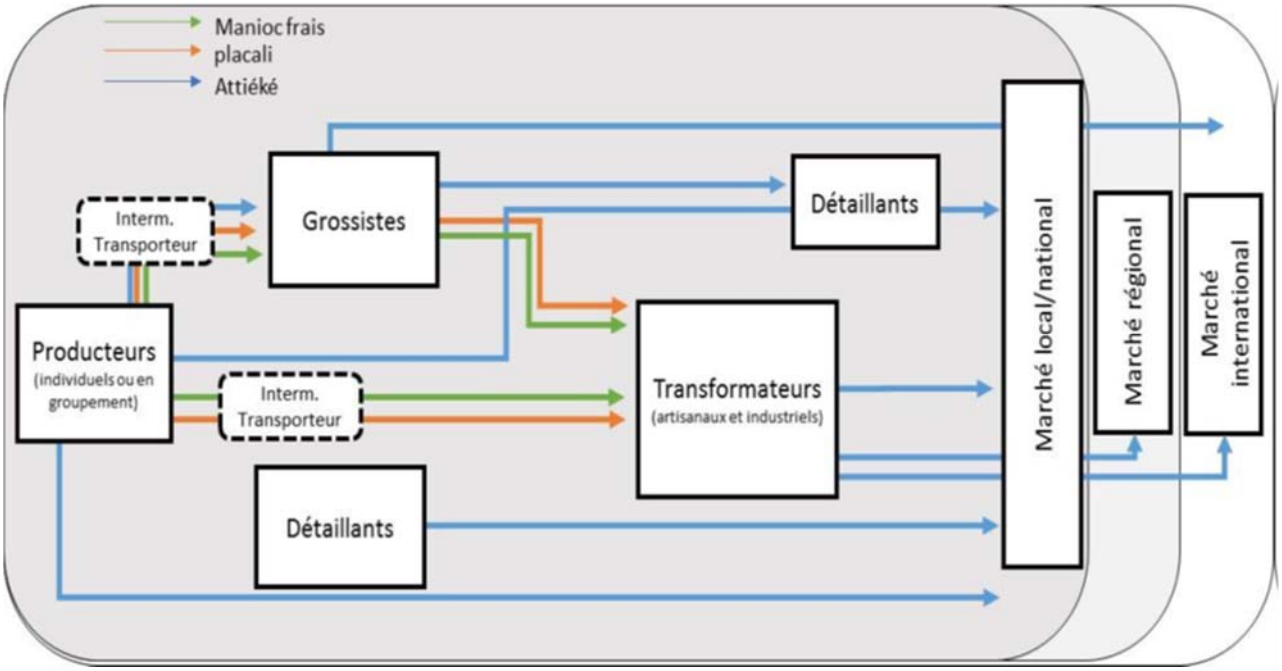

Figure 2 : Distribution channels of Attiéké in Côte d'Ivoire

Source: Mendez del Villar et al., (2017)

The national consumption of attiéké is estimated to be between 100 and 110Kg / capita in 2016 (Mendez del Villar et al., 2017). National consumption of attiéké is estimated at 2.475 million tonnes of fresh cassava equivalent, or 1.167 million tonnes of attiéké (2.475 million tonnes divided by a conversion factor of 2.12).

International actors are those of the UEMOA sub-region and non-UEMOA actors. The actors of the countries of the sub-region are composed of Ivorian expatriates and nationals of these countries. They produce both hand-made attiéké and industrial attiéké. The actors outside the sub-region are mainly Asian manufacturers who produce attiéké destined for Europe and the United States. Production is estimated to be relatively high but no statistics are available (Amanzou, 2014).

Size and trends of the demand segment associated with the product

According to Dr Nindjin, the local market is the dominant market in terms of total revenue. However, consumers are increasingly demanding about quality and hygiene around the product (Amanzou, 2014). This leads to a shift in market trends towards industrial production. Indeed, industrial demand is growing. This growth is explained by a higher demand from consumers and a strong external demand**.**

Geographic and agro-ecological context of demand segments for the product

Traditionally, attiéké is produced and consumed by people from the Southern parts of Côte d'Ivoire (Adjoukrou, Alladjan, Ebrié, Avikam and Ahizi). Local consumption has extended today to the entire territory. The largest processing units are located in major consumption centers: Abidjan, Bouake, San Pedro, Yamoussoukro, etc. (Perrin et al., 2015).

Description of the product chain including how the product is processed, prepared, transported, stored and sold and by who (e.g. gender, socio-economic status, age, region etc.)

The preference of a consumer is a function of the level of knowledge of the product. Indeed, the different types of attiéké and their taste and organoleptic characteristics are less known to consumers. However, agbodjama is identified by the consumer by visible grains, rounded and of homogeneous size. The one of Dabou is recognized by the angular and compact shape of the ball of attiéké which has a semblance of a small vacuum. Apart from these types of attiéké, other types of attiéké are quite difficult to be recognized by consumers (Amanzou, 2014, Nindjin et al., 2017).

However, in the South of the country, more attention is paid to the size of the grains during the shaping of grains and the cooking time is longer when the attiéké is for self-consumption. If it is for sale, the preparation is less careful for cost reasons. In the Center of the country, fermentation is done with any variety of cassava and cooking times are usually shorter. In the North, garba is consumed more often (Mendez del Villar et al., 2017).

The attiéké value chain

Processing is predominantly artisanal, although industrial type units tend to develop. However, marketing is more diversified with short supply chains for local markets, and longer channels for supplying regional, national and export markets in the sub-region and internationally (mainly to Europe) (Nindin et al., 2017).

Mendez del villar et al. (2017) identify the attiéké value chain as follows:

Producers (farmers) are mostly women. Men are called to reinforce the cultivation of cassava for the most physical field work, such as bush clearing and pulling the tubers at harvest.

Carriers / collectors are service providers working at the request of farmers, processors or wholesalers. They usually move from village to village to load their tarpaulin-covered vehicle (Toyota pick-up). On average, the quantity of cassava that fills a tarpaulin-covered vehicle weights between 2 and 2.2 tonnes. The cost of freight is very variable and increases with the poor state of the roads.

Processors: women are the ones who process cassava into attiéké. In artisanal processing units, each woman works for her own account. When the processing unit is organized as a cooperative or association, the roots are distributed between 8 to 10 women members. For entrepreneurial-type processing units, it is one or more women who employ dayly laborers for different tasks. Most industrial or semi-industrial units are run by men.

Wholesalers: Wholesalers can work on order to deliver cassava roots directly to a processing unit.

Retailers: From processing units, they buy packaged bags of 40 kg and repackage and sell in bags or balls of about 300 grams.

Caterers: They get their supplies in the form of placali (for the preparation of foufou) or in attiéké from wholesalers. They can also buy directly from processing units when they are nearby. They sell the attiéké mixed with chicken, fish or other ingredients.

Haoussa traders (a ethnic group from Niger): A network of traders and caterers from the Haoussa community organizes the supply and distribution of attiéké, particularly of the garba type (served with tuna), from the purchase of fresh cassava and attiéké from processors in the intererior of the country to the outlets in urban centers.

Exporters: they work with industrial or semi-industrial units based in big cities. However, artisanal processing units located in border areas in the North, West and South-East sell placali or attiéké to importers in neighboring countries.

Dr. Nindjin summarizes the attiéké value chain as follows: **cutting suppliers** (80% male and 20% female); **land suppliers** (100% male); **cassava producers** (80% male and 20% female); **artisanal processors** (100% female); **industrial processors** (80% male); **sellers:** (retailers are 80% female and wholesalers are 80% female); c**onsumers.**

The profitability of the product, by demand segment

Mendez del villar et al., (2017) conducted a financial analysis of the cassava value chain, pressed pulp and attiéké, covering producers, processors and traders. The analysis was made according to three processing sub-chains: artisanal, semi industrial and industrial, and three marketing sub-chains: rural, urban secondary and urban. It appears that in the attiéké value chain, producers capture 44% of direct value added, processors 14%, and traders 42%, of which 25% are for wholesalers and 17% for retailers. In the export sub-chain, 44% of direct value added is created by producers, 21% by processors, and 35% by exporting traders.

Gaps in literature? Anything that RTBfoods can address?

Of all the documents consulted, the report by Mendez del Villar et al. (2017) is the lastest and most comprehensive in terms of analysis of the cassava value chain, although it does not take into account the microbiological quality of the product that is of interest attiéké. It is noted that women are the main actors in the cassava value chain and attiéké in Côte d'Ivoire. Attiéké is the most competitive cassava by-product because it is accessible on all budgets and appreciated by a large part of the population of all ages. Creating new varieties of cassava that meet the needs of users will require special emphasis on information dissemination and user training for better adoption.

3.5. References

Amanzou N. A. A. (2014), « Consentement à payer de l'attiéké de Côte d'Ivoire : cas des départements de Grand-Lahou, Jacqueville, Dabou, Abidjan et Yamoussoukro ». *Mémoire de master 2, UFR des sciences économiques et développement, Université Alassane Ouattara*.

Mendez del Villar, P., Adaye, A., Tran, T., Allagba, K., and Bancal, V. (2017), Analyse de la chaîne de Manioc en Côte d'Ivoire. Rapport pour l'Union Européenne, DG-DEVCO. Value Chain Analysis for Development Project (VCA4D CTR 2016/375-804), 157p + annexes.

Mobio A. J., Fokou G., Aka S., Kouakou P., Kouassi K. B., Amanzou N. A. A., Dao D., and Bonfoh B. (2017), « social and ecological drivers of cassava shortage in Côte d'Ivoire », en cours de publication.

Mobio A. J. (2015), « Construction sociale de la qualité de l'attiéké de Grand-Lahou et Dabou en Côte d'Ivoire ». Mémoire de Master 2, Institut d'Ethnosociologique (IES) Université Félix Houphouët Boigny

Nindjin C., Amanzou A.A.A., Mobio J., Fort F., and Baud G. (2017). Etude de marché de l'attiéké, Côte d'Ivoire. Projet FAO, Rapport Final d'Activités, Mai-Août 2017, 60 p.

Perrin A., Ricau P. and Rabany C. (2015), Etude de la filière Manioc en Côte d'Ivoire. Rongead, Ocvp, Chigata, CFSI. 15 décembre 2015. 87p.
http://www.rongead.org/IMG/pdf/diagnostic_de_la_filiere_manioc_en_cote_d_ivoire_15_12_2015_final.pdf

3.6. Citations

Citations	Country and region of focus
Amanzou N. A. A. (2014), « Consentement à payer de l'attiéké de Côte d'Ivoire : cas des départements de Grand-Lahou, Jacqueville, Dabou, Abidjan et Yamoussoukro ». *Mémoire de master 2, UFR des sciences économiques et développement, Université Alassane Ouattara*.	Côte d'Ivoire, Départements de Grand-Lahou, Jacqueville, Dabou, Abidjan et Yamoussoukro
Mendez del Villar, P., Adaye, A., Tran, T., Allagba, K., Bancal, V. (2017), Analyse de la chaîne de Manioc en Côte d'Ivoire. Rapport pour l'Union Européenne, DG-DEVCO. Value Chain Analysis for Development Project (VCA4D CTR 2016/375-804), 157p + annexes.	Cote d'Ivoire, Korhogo, Bouaké, Yamoussoukro, Bouaké, Daloa, Abidjan, Aboisso, Adzopé, Duekoué
Mobio A. J., (2015), « Construction sociale de la qualité de l'attiéké de Grand-Lahou et Dabou en Côte d'Ivoire », mémoire de Master 2, Institut d'Ethnosociologique (IES) Université Félix Houphouët Boigny	Côte d'Ivoire, Départements de Grand-Lahou et Dabou
Mobio A. J., Fokou G., Aka S., Kouakou P., Kouassi K. B.,, Amanzou N. A. A., Dao D., and Bonfoh B. (2017), « Social and ecological drivers of cassava shortage in Côte d'Ivoire », en cours de publication/in press.	Côte d'Ivoire
Nindjin C., Amanzou A.A.A., Mobio J., Fort F., and Baud G. (2017), Etude de marché de l'attiéké, Côte d'Ivoire. *Projet FAO, Rapport Final d'Activités, Mai-Août 2017*, 60 p.	Côte d'Ivoire
Projet FIRCA-IG (2015), Attiéké de Grand-Lahou: spécificité de la qualité et plan d'actions de valorisation selon la démarche des Indications Géographiques (IG). *Rapport Final, Février 2014-Aout 2015*, 192 p.	Côte d'Ivoire, Département de Grand-Lahou
Perrin A., Ricau P., and Rabany C. (2015), Etude de la filière Manioc en Côte d'Ivoire. Rongead, Ocvp, Chigata, CFSI. 15 décembre 2015. 87p. http://www.rongead.org/IMG/pdf/diagnostic_de_la_filiere_manioc_en_cote_d_ivoire_15_12_2015_final.pdf	

Institution: Cirad – UMR QualiSud

Address: C/O Cathy Méjean, TA-B95/15 - 73 rue Jean-François Breton - 34398 MONTPELLIER Cedex 5 - France

Contact Tel: +33 4 67 61 44 31

Contact Email: rtbfoodspmu@cirad.fr