SUBSTANCE AGRICULTURE AND ECONOMIC GROWTH: CASSAVA CULTIVATION AS A FACTOR OF PRODUCTION IN THE ZOU-COLLINES REGION OF BENIN

Dr. Emile AIFA   Lecturer at the University of Parakou (UP) – BENIN

ABSTRACT   Cassava's cultivation which is wrongly or rightly regarded as production factor in Zou-Collines region where plant is scarce, is assimilated in this study to the capital. This is the issue of this study, which is based on a Cobb-Douglas production function inspired from Solow, sought to experiment. Accordingly, cassava's cultivation contributes to the production growth in this region of Benin.

KEYWORDS : substance, agriculture, economic, growth, production, function, cassava.

The predominantly agricultural sub-area region where about 92% of the population derives their income, the zou-collines region is located in the central part of the Republic of Benin, where it occupies one in six of the zone. It is border with five other areas of the country and is populated about 1568181 inhabitants according to the general census of the population and habitat of 2013. As recognized in the economic literature and recommended by the PSRA[1] (MAEP[2], 2004) within the framework of the contribution to the achievement of growth and the MDOs[3], this region of Benin provides a major importance to the farming.

Indeed, many studies highlighted the role of farming particularly the food- producing agriculture on the development of an economy viewed [Malasis (1969), Mounier (1992), Douglas (1995), World Bank (2008)]. Most of these studies specifically emphasized on the impact of farming on the economic growth as well as on the reduction of the poverty [(Johnson et Mellor, 1961), (Kassé, 1996), Roméo et Marcelle (1998)].

In the light of theses analysis, zou-collines region's economy is increasingly based on the farming of cassava which is extensively cultivated in demand to the economic growth and populations' food security of the populations. Multifunctional character and the economic importance of cassava's cultivation as perceived by people through observations of the ground needs to be questioned.

Could cassava's cultivation contribute significantly to economic growth in this region? This is the concern that trying to test this research on the perimeter of experimentation of the Beninese territory which title is: food agriculture and economic growth case study of cassava' cultivation in Zou-Collines region in Republic of Benin

The general objective aimed at conducting this research is to point out the strategic role of cassava's culture in the process of growth of many economy of this agricultural region point of Benin the specific objectives express themselves as follows:

- quantify the real effect cassava's cultivation has on the production level in Zou-Collines region,
- advocate for economic policy measures in order to improve agricultural production in this region of Benin.

The originality of this research lies in the fact that cassava's cultivation is assimilated to factor of production, specially "capital" which is extensively stressed on technical resources (machines).

The rest of the study is divided into three parts. The first section presents the situation of cassava cultivation in the Zou-Collines region. The second section discusses the literature on the role and importance of agriculture in an economy. The third section shows an econometric approach to the impact of cassava cultivation on the economic growth of this region of Benin and inspires a conclusion in the formulation of economic policies.

1-Characteristics of the cassava's cultivation in Zou-Collines region
Much more diversified than agriculture of export pulled by the cultivation of cashew and cotton, food agriculture in Zou-Collines region is characterized by its diversity and the predominance of the cassava production whose contribution to the food supply is more than fifty percent[4]. For all these reasons are indicative to the importance and the usefulness of cassava's cultivation necessary to grasp some of matters it raises.

1.1 Socio-economic importance of cassava's cultivation in Zou-Collines region
Zou-Collines region's economy is highly dependent on agriculture which is vey user of labor is largely practiced by independent producers (growers, farmers, agricultural holders) and characterized by its diversity. It is mainly dominated by the production of crops, combining all forms of cultures: oilseeds, fruits cereals, tubers. Most of the farmers have little of inputs due to the lack of financial means during the agricultural years[5]. Overall, in these circumstances, the increase of production is made out by the extension of cultivated areas.

This pressure on the farmland is consecutive to the practice of extensive agriculture with little tools reinforces the idea that the preparatory of cassava's cultivation on a cropland would amend and fertilize it.

Indeed, though its multifunctional ability, cassava plays a major role in the economy of this region. Not only does it represent the main source of income for rural populations but also for food supply[6]. For this reason, it is considered the plant to root the more cultivated and the most consumed in this region according to the Ministry of Agriculture, Livestock and Fishing (2011). It is also grown on the whole national territory and helps more than forty five percent according to the national statistics for agricultural supply. Various uses of cassava in this region (food, feed, industry, manure) are a result of the variety of processing techniques and the resulting products. Gari is the favorite staple food widely consumed throughout the country, its affordability and fairly easy-going character; it remains the most refueling supplies which secure the country in the field of food. Staple food of many inhabitants of Nigeria, first power economic and population of Africa, this speculation appears also as undeniable source of income for people in this border region of Nigeria and Togo.

In addition, in this part of the country, where productivity remains low, prior cassava's cultivation over the areas seems to be perceived wrongly or rightly as a factor of production, including resource based on its effect on soil fertilizer. Indeed, through his explanation, capital refers to the sustainable ways that combined work in productive activity. For most farmers in this locality, cassava's cultivation can be seen as a capital intensive role and its first role, through its characteristic of perennial culture, its ability to reproduce itself. Indeed, cassava is a plant which generates itself from stems cuttings. This kind of cultivation remains durable item and is considered agricultural accounting as operating capital. Then, it is a plant which farmers use abundant foliage falls and debris post-harvest to maintain the soil fertility. Furthermore, due to the high starch of the tubercular roots, cassava is an important source of metabolic energy. Some agronomic studies confirm this observation [Raffaillac, (1996 ; 1997), Colombo (1996), FAO (2013)]. In reference to cultural practices, cassava can be grown in monoculture o a space, in association to cultural practices, cassava can be grown in monoculture on a space, in association or especially in relation with other crops such as maize, grain, millet, cowpea, groundnut and the market gardening (tomatoes, okra, pepper). Agronomic research for example, teach us that nitrogen

released by decomposition of the biomass green and leafy of cassava significantly improve the performance of some grasses including maize. This ability to increase production from the mechanism of transfer of fertility to culture, gives to cassava's cultivation its assimilation in the capital. In conclusion therefore, the cultivation of cassava is able to participate in the process of expansion and intensification of production and, as such, is considered to be agricultural operating capital. Other considerations no less important are its nutritional and energy contribution to the strength of the work that makes it more productive, not to mention the effect of dissemination that it may induce through its derivatives in the rest of the region's economy. All these considerations have certainly contributed to the growth in cassava in the territory of the country which on the other hand, has been analyzed as an annuity that is exploited. It is under these conditions that it becomes interesting in this region any action contributing to explore any virtue of cassava's cultivation. The study of its economic importance offers for this purpose, a fertile ground for experimentation. The food crisis of 2008 has made this state of affairs far more decisive in terms of its scope in the national food safety net (MAEP,2011).

1.2 The recent evolution of cassava's cultivation in Benin
Crop that enjoys high yields, cassava has emerged gradually over time as the main food in Benin. This singular evolution is explained according to the Ministry of Agriculture of Livestock and Fisheries (2004) by several determinants, mainly incentives due to the implementation of specific program: the CDP (Cassava Development Program), the Chinese cassava processing industry at Logozohè for the production of cassava, without forgetting the people's lack of interest in cotton, facing a problem of prices volatility at international level.

Indeed, from the point of view of the importance of the food crops, cassava occupies a prominent place in terms of production. The enthusiasm for production is explained by an upward trend since the 1980s. (See graph below)

1. Strategic Plan to Boost Agriculture Sector
2. MAEP (Ministry of Agriculture, Livestock and Fishing)
3. Millenium Development Objectives
4. CARDER Zou-Collines, annual report 2012-2013
5. MAEP/DPP, yearbook, 2012-2013
6. MAEP/DPP, yearbook, 2012-2013

Graph I: Evolution of national production of cassava (ton)
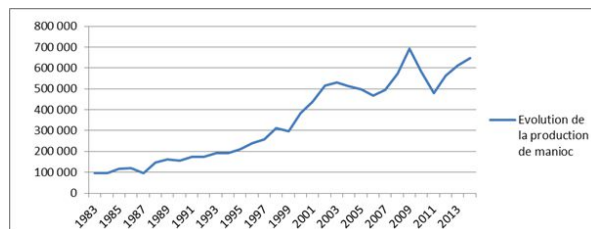
Source : CARDER (Centre d'Action Régional pour le Développement Rural) Zou-Collines

Cassava's cultivation has grown quickly over and exhibits an exponential appearance as illustrated in the curve above characteristic of its evolution. Indeed, during the period 1990-2005, following to the signal received from the devaluation of franc cfa in 1994, the cassava's cultivation has grown almost exponentially. As might be expected, this monetary adjustment marked by the higher prices for imported goods, certainly boosted the production of cassava in substitution for these imported goods. This upward trend has been enhanced during the period 1996-2000 when cassava production increased rapidly in a movement of high amplitudes. The incentives created by the Government through the implementation of the program of development of the cassava sector undoubtedly the Logozohè and the processing plant contributed to this spectacular evolution.

Indeed, beyond the media hype orchestrated around these two initiatives, the concrete actions they have undertaken on the ground have made it possible to boost significantly the production of this root. The following decade (2001-2010) characterized by a slowdown in average output growth, can be seen as the combined and contradictory effects of farmers' lack of interest in low-wage cotton and the demonization of the juvenile layer compared to agriculture which

remains dependent on the archaic means. Recognizing this situation, this is likely to have a lasting impact on the country's balance of trade. The Government will start in 2012 to promote the cotton cultivation, main export crop. This very active policy evolutes ups and downs in recent years. However, compared with the main agricultural crops produced by Benin, cassava remains the best in terms of contribution to the national agricultural supply as shown in the following table.

Table I : Evolution of main cultivations production in Benin (ton)

Items	1990		1995		2000		2005		2010	
	volume	%	Volume	%	volume	%	volume	%	volume	%
Agriculture production	3 050 944	100	4 212 687	100	5 199 576	100	5 929 198	100	8 145 410	100
Cotton	144 900	4,7	338 000	8	339 900	6,5	163 468	2,8	136 958	1 ;7
Yam	1 046 131	34,2	1 287 741	30,5	1 742 004	33,5	2 056 767	34,7	2 988 229	36,7
Maize	409 492	13,4	563 203	13,3	750 442	14,4	840 953	14,2	1 170 605	14,4
Cassava	937 313	30,7	1 328 634	31,5	2 350 208	45,2	2 987 519	50,4	3 490 731	42,9

Source : ONASA (Office national pour la sécurité alimentaire)

2 Literature review
Throughout the world economic literature, various authors have long been interested in agriculture. To understand the problem of development, we need to know the role and the importance of agriculture in an economy. Several research works have been devoted to it. They range from theoretical foundations to empirical studies. In this study, we set about some of these writings on the main purpose of drawing inspiration from them in order to derive a model that can efficiently explain the effects of cassava's cultivation growth in Benin.

2.1 Theoretical foundation of the economic role of agriculture
Economic history reveals the importance of agriculture in the development process. It is not surprising that the first economic reflections focused on agriculture as the lever of economic growth, which is a prerequisite for any development viewed (Basle and al.,1993). The physiocrats saw in agriculture the almost exclusive source of all wealth. Not only was agriculture a fundamental business for this line of thought, but also a major activity for individuals who devoted the bulk of their income to their food. Development economists found in agriculture, the sector upstream of other sectors of activity insofar as it provided than with the necessary resources for their development.(Lewis, 1995) had pointed out that the role of agriculture is equivocal in the take-off of an economy. For this author, the agricultural sector participates in the formation of capital, freeing the labor of low productivity to supply other sectors including industry by establishing a market for industrial products suppliers of the currencies allowing financing the imports. In his conclusion, which is similar to that of Lewis in 1995, but distinct from the way agriculture affects economic growth. Malasis (1961) showed that when adapting the supply of agricultural production to quantitative and qualitative growth of food demand,, by transferring resources in the form of workers and capital, raising the productivity of agricultural labor by becoming a customer of other branches as its income that agriculture contributes to the increase of local production. Moreover, the place of agriculture in any development strategy of a country is attested by relevant facts. Japan, through cultivation of silks, was distinguished as one of the few countries to have succeeded I financing its development without resorting on external savings. Similarly most economist agree that the industrial revolution at the end of the seventeenth century in England would certainly not have place, it had not been preceded by agricultural revolution, was broad and profound which made it possible to improve the basis of productive accumulation liberated much of the labor force In favor of the industrial sector mainly to feed cities and expand domestic opportunities by increasing the purchasing power of the farmers stated (Kassé, 1996). Previous to the later, in a general formula, Adama Diaw (1995) saw, as for him, expanding agriculture the prominent hey machine for real development which in turn, creates the conditions for widespread growth, capable to reduce poverty. The author believes that the growth of agriculture favors the rest of the economy. The poor benefit directly from it if they are farmers and they also benefit indirectly from the increase from the increase demand for labor and non-agricultural products. Gills and al. (1998)

did not come to the opposite conclusion when they consider that agriculture, through its potential earnings, attracts foreign direct investors who are likely to create jobs and open up new niches of employment, investment for local production. Pierre Raneili (2007) goes on to show that the impact of agricultural growth on poverty reduction is unequivocal in developing countries. For him, the improvement of agricultural productivity leads to the fall in food prices: this allows an increase in demand. As a result, the use of inputs is increasing and primary processing activity can take place and this movement has repercussions on the rest of the economy. Until recently, in its World Development Report in 2008, the World Bank has come to the conclusion that agriculture contributes to economic development as an activity, means of substance and providers of environmental services, making it a unique key tool of development. To illustrate this assertion, the World Bank (2008), based on the Chinese economy case, sowed that accelerated agricultural growth through household empowerment, market liberalization and rapid technological change- was largely responsible for the decline in rural poverty from 53% I 1981 to 8% in 2001. All these theoretical writings analyzing the role of agriculture in the economic sphere usually lead to the conclusion that this sector contributes to economic growth. It remains to be seen whether this remark seems to be confirmed empirically in practice.

2.2 Empirical approaches to the impact of agriculture on the economy
Attempts at empirical evidence of the connection between agriculture and growth have mostly addressed the issue in comparative approach. Thus, the contribution of the agricultural sector evaluated in comparison with other sectors of the economy. It was in this light that research on Kenyan agriculture was carried out by Block and Timmer (1994). These authors showed in their study that the multiplier agriculture effect is higher than in other sectors. Indeed, finding that a dollar from farm income generates an additional 0,63 dollar US at the time it reproduces only 0,23 in the case of the non-farm sector, the authors conclude that a larger contribution from agriculture to the economic growth of Kenya. As a follow-up to this study, Degado and al. (1998) found, in a study of four African countries, income 2,50 dollar multiplier. This means that every additional dollar invested in agriculture unit leads to economic growth equivalent to 2,50 dollar. Similarly, Gollin and al. (2002), using data from 62 PEDs in a panel data econometrics approach, conclude that the agricultural sector explains better the economic growth comparing to others sectors. The authors found that agriculture contributes 54% to the formation of national wealth, while contributions from the non-agricultural sector and sectoral changes were 17% and 29%, respectively, confirming the predominance of agriculture in national activity growth.

All these studies attesting to the contribution of agriculture to the growth of economy nevertheless present the weakness not to internationalize in their approach the specific aspects concerning the structuring of the economies studies organization. The degree of agriculture integration to economic growth varies from country to country according to the level of the development of each country.

Indeed, as Malassis (1994) has already pointed out, growth is a process of international transfers. Adzio-bika and al. (2004) had viewed it from a study in which they showed that the degree of correlation of agriculture to growth is higher in China than in South Africa of the Sahara. The same study observed that, unlike Burkina Faso and Congo, where agriculture has a positive effect on economic growth, this influence is negative in Cameroon. The authors explain this kind of reaction by a strong upturn in the general situation of the Cameroonian economy where the position of agriculture is reduced. In the same vein but this time in a varied Granger causality test applied to a panel of countries, Tiffin and Irz (2006), find a strong causality between agriculture economic growths for the developing economies while for developed economies this causality is not proved. This kind of observation, which is not in keeping with the theory, can be explained by the fact that these studies have globally integrated rather than focusing on a specific branch of the sector. For example, in a study analyzing the sources of growth in Zimbabwe, Roméo and Marcelle (1998) show by comparing exercise between industries, food production has a larger multiplier effect on the gross domestic product than traditional or non-traditional export crops. Indeed, since agriculture is a very wide and varied field, it goes without saying that agricultural policies differ from one country to another, from one branch to another and from one branch to another from one production system to another. For this purpose, analyzing integrating the sector

overall may skew results insofar as the economies neither have the same potential, nor the same development strategies still less the same comparative advantages. This evident relevant remark, seems, however uplifting for Benin whose agriculture occupies less and less an important part in the Gross Domestic Product (GDP) unlike its expanding cassava industry. Hence, the real willing to study the Gross Domestic Products is important in reply to the evolution of cassava production.

3   Empirical analysis of cassava contribution to economic growth
As we have just described in the review, with a few nuances, the positive link between agricultural production and the growth of economic activity is found in several studies, including that of Johnson and Meller in 1961 that had the merit to identify five types of sectoral linkages that emphasize the role of agriculture in economic growth. These linkages through both consumption and production include: (i) supply of food for household consumption (ii) the supply of surplus labor available to industries, enterprises; (iii) facilitating the emergence of new outlets for domestic industrial production (iv) increasing the supply of domestic savings for industrial investment and (v) supplying foreign exchange earnings from agriculture exports. This observation converges, apparently with the economic situation of cassava in the zou- collines region. In fact, food for men and animals, the cassava contributes to food security and the exportable supply. In addition, cassava root starch can also be used in a huge assortment of artisanal and industrial activities including textiles, plywood, paper and adhesives, biofuel ethanol. It is highly unlike that it positively impacts economic growth. However, the best way to experiment is to adopt an econometric model on the basis of which results can be evident.

3.1 Presentation of sample example or model
This presentation is carried out on the Solow model which is based on the Cobb-Douglas type production function is defined as follows:

$$Y = A K^a L^b \qquad (1)$$

From this presentation, Y, A, K and L respectively represent the regional production approximated by data whose regional agricultural production is about 92% (series observed at National Institute of Statistics and Economic Analysis), whereas the technological factor, capital and labo , a and b constitute the parameters to be observed.

Linearized by its transformation and a logarithmic function which is presented in the following form as follow:

$$Ln\,Y = Ln\,A + a\,Ln\,K + b\,Ln\,L + \mu \ (2)$$

Ln A is a constant, (2) becomes $Ln\,Y = C + a\,Ln\,K + b\,Ln\,L + \mu$ (3), Ln A = C

In this study, it is important to identify the variable Y, K and L from which the parameters a and b the constant C will be checked.

- Variable Y
This variable indicates the regional production of which the agricultural production represents on average 92%. Since the series of agricultural production was known and available to the Regional Action Center for Rural Development in zou-collines, it was sufficient to weigh it by the coefficient 1,087(1,092) to deduce from it the regional production figure

- Variable K
As stated above, capital refers to all sustainable means combined with the labor factor generating production. Viewed in this way, cassava's cultivation can be approximated as a capital in the process of regional production. The series to be used for the estimates relates to the regional production which will be obtained at the Regional Action Center for Rural Development zou- collines. The main idea is to capture the cassava's cultivation impact on economic activity, the ability to assist the increased cassava production. Indeed, by its fertilizing effects on soil and nutritional on the labor's strength, on the one hand, its action in the other sectors of the local economy (crafts, livestock, trade) as raw material or input; it successfully participates to enhance the strength of the production machine. This variable was delayed by a period of one year due to its anticipatory and preparatory effect on current product.

• variable L

As an indicator of the labor variable, we will use the labor for series in the region. This series are obtained from National Institute of Statistics and Economic Analysis which it estimated from the general survey on population and housing censuses of the years 1979, 1992, 2002, and 2013

• Dummy variables dm94 and dum9

Two dummy variables were introduced in the model in order to capture the effects of the devaluation of the franc cfa which occurred in 1994, was assumed to be adjusted after 20 years with the effects implemented in 1997. If the devaluation effects were taken into consideration from 1994 onwards, those relating to the above mentioned project are assumed to be concerned with their period of implementation , namely the period 1997- 2002.

In order to get efficient results, all these considerations mentioned become the estimated equation.

$LnY_t = C + aLnK_{t-1} + bLnL_t + cDum94 + dDum97 + \mu_t$ (3) ; c et d will be estimated.

3-2 Data presentation

Using the ordinary least squares (OLS) method, model estimation leads to the following equation derived from schedule 2.

$LnY_t = 18.22 + 0.094\ LnK_{t-1} + 0.089\ LnL_t – 0,340\ Dum94 – 0,055\ Dum97$ (4)
(0,00)   (0,00)   (0,09)   (0,00)   (0,00)

This is long-term equation including information on the coefficient of determination.

R= 0,95 through Fisher, F=128,90 through Waston Durbin, DW= 1,95 greater than R square and close to the figure 2 appear to be generally satisfactory. However, working on time series, these results invite us to a more in depth analysis. For this purpose, it is necessary to verify on the one hand, the stationary and non stationary nature of the series, on the other hand, the probable presence of co-integration between them. In the appendix these texts are presented in the tables.

The concrete idea is that the variables are all integrated of order 1 where exists at least one co-integration relation between them since the estimated residues from the long-term equation are stationary. Hence, the estimation of an error correction model (ECM) whose validity has been proved through texts of normality, self-correction of hetero-elasticity and stability.

In view of the above, the results of short terms are as follows:
$DLnYt-1 = 13,79 + 0,03DLnK_{t-1} + 0,02DLnL_t + 0.1LnK_{t-2} + 0,03LnL_{t-1} – 0,75Y_{t-1} – 0,3Dum94 – 0,01Dum97$ (5)
(0,00)   (0,29)   (0,65)   (0,00)   (0,55)   (0,00)
(0,00)   (0,39)

As for the long term, the terms auto-correlation, normality, hetero sedasticity and stability performed at this level are also appropriate. It is therefore necessary to interpret these findings in order to allow the implementation of efficient policies in favor of Beninese farmers.

In the short term, only variables Y_{t-1}, K_{t-2} and Dum94 are significant threshold. Among these variables, one is capable to delay manioc production, represented by K_{t-2}, is consistent with te expected sign, insinuating, as suspected by the observations that the cassava crop actually impacts economic growth in this region of the country. For the long term, all the estimated factors are significant at the 10% threshold. The capital represented here by the cassava's cultivation has still given the long-term expected effect. Significant and consistent with the

initial hypothesis, this variable is sensitive to national production increasing it to 9,4% for a 1% increase in production. In other words, cassava cultivation contributes to the growth of production in the zou-collines region. This observation seems justified for this food crop, bound the popular nature of its consumption, sustainability and its perennial reproduction. Indeed, beyond the fact that, it contributes to the increase of production, participates in the fertilization of the soil, it gets along with the main dishes referencing the national diet (past, bean, rice).

Moreover, as expected, the labor factor is positively significant sensitive to its cultivation. There is a positive correlation between the dummy variables (Dum94 and Dum97) and cassava cultivation as indicated in Appendix, in line with theoretical expectations. On the other hand, contrary to all expectations, the negative sign of Dum94 and Dum97 contrasts whit the theoretical predictions of the model. Such an autonomic result to economic logic could have its source in other than empirical constraints. It is generally characteristic of agricultural work in developing countries where socio-cultural variables, are difficult to be captured due to the poverty of statistical data where they interfere a lot (Cabral, 1997). Indeed, if the Dum94 variable, captured by the monetary adjustment, the preceding explanation could be evoked due to the negative perception that the populations of the developing countries often have of the devaluation, it is possible that within the framework of the variable Dum97 represented by the PDFM implementation, question of nationality and efficiency of projects in these DCs on economic growth deserves to be questioned.

Either investment has been diverted from its original dimension, which in either case raises the question of good economic governance of projects. Thus, the connection between the variable Dum97 and national production may depend in part on the quality of the governance of the carried project.

Conclusion

At the end of this study, evidently one can conclude the presence of a very interesting opportunity for significant development of the sector, both for food security, for export as well as for increased incomes. In addition, with its nurturing role, cassava roots can easily fill other function in a socio-economic context. Its consumption is predominant in the Beninese economy where it generally goes hand in hand with other foods namely maize paste, rice, legumes, bananas, edible oils. It remains staple food. In addition, staple food in neighboring Nigerian market, cassava offers enormous export opportunities without hiding the one from the western countries where it is used for refueling of their industries. The current position of cassava in Beninese agriculture is central to the development of any strategy for economic development. It gives signal to economic and political decision-makers to organize and promote this sector which future looks promising. Certainly sporadic actions of the State were undertaken within the framework of the PDFM; however, they remain less intensive and sustainable impact economic growth for real development. Indeed, the intensive cultivation of cassava could help to break the vicious circle of poverty resulting in particular from low income and inadequate fulfillment of basic needs It deserves to be promoted in the image of cotton in a perspective of diversification, very close to Benin state as mentioned in several strategic documents. As acknowledged by the MAEP - Ministry of Agriculture of Livestock and Fisheries - (2004) affirmed in the PSRSA so as to achieve the MDOs goals particularly in terms of improving agricultural incomes, by meeting vital needs. The promotion of food chains such as cassava is crucial for the growth of the Beninese economy. However, it is recognized that cassava cultivation variable is not the only explanatory factor for economic growth in this region of Benin; the objective set to this study is to show the prominent role this culture could evidently play in current context.

ANNEXES
Annexe 1: Données sur la région du Zou-Collines

Année	Production régionale Y	Production de manioc K	Population active L	Année	Production régionale Y	Production de manioc K	Population active L
1983	683 654 496	96 695	409 548	1999	595 321 637	295 222	658 944
1984	715 915 033	97 259	421 098	2000	596 322 942	383 817	678 665
1985	785 800 000	116 529	432 972	2001	617 367 601	438 749	698 853
1986	794 504 950	120 710	445 182	2002	627 321 157	514 595	719 803
1987	779 904 385	95 257	457 736	2003	641 221 374	530 329	486 381
1988	802 336 601	146 614	470 645	2004	656 972 409	513 703	502 157

1989	775 647 249	162 801	483 917	2005	646 672 379	497 920	518 810
1990	801 163 919	156 219	497 563	2006	650 539 867	467 792	535 873
1991	824 671 158	174 408	511 595	2007	663 897 893	494 295	567 843
1992	823 208 723	173 474	540 711	2008	650 352 734	573 424	598 850
1993	832 725 061	191 106	558 284	2009	656 473 931	692 467	630 637
1994	635 585 586	190 967	576 428	2010	659 631 247	581 789	663 183
1995	582 110 002	208 767	595 162	2011	666 725 852	480 439	696 487
1996	570 748 673	240 216	614 505	2012	661 374 777	563 626	730 563
1997	579 491 256	258 895	621 169	2013	692 622 046	611 535	783 042
1998	571 248 741	310 246	639 814	2014	734 179 368	646 748	835 171

Annexe 2 : Equation à long terme

Dependent Variable: LNYT				
Method: Least Squares				
Date: 03/30/16 Time: 19:05				
Sample(adjusted): 1984 2013				
Included observations: 30 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNKT (-1)	0.094165	0.016478	5.714404	0.0000
LNLT	0.088844	0.050389	1.763144	0.0901
DUM94	-0.339806	0.022609	-15.02947	0.0000
DUM97	-0.055337	0.016281	-3.398941	0.0023
C(1)	18.21991	0.624454	29.17736	0.0000
R-squared	0.953758	Mean dependent var		20.33799
Adjusted R-squared	0.946360	S.D. dependent var		0.122388
S.E. of regression	0.028346	Akaike info criterion		-4.137678
Sum squared resid	0.020087	Schwarz criterion		-3.904145
Log likelihood	67.06517	F-statistic		128.9097
Durbin-Watson stat	1.954790	Prob(F-statistic)		0.000000

Annexe 3 : Matrice de corrélation

	LNYT	LNKT	LNKT (-1)	LNLT	DUM94	DUM97
LNYT	1.000000	-0.527917	-0.506370	-0.510505	-0.895115	-0.543361
LNKT	-0.527917	1.000000	0.977890	0.717494	0.734546	0.145800
LNKT(-1)	-0.506370	0.977890	1.000000	0.684806	0.725405	0.091871
LNLT	-0.510505	0.717494	0.684806	1.000000	0.556037	0.406060
DUM94	-0.895115	0.734546	0.725405	0.556037	1.000000	0.363318
DUM97	-0.543361	0.145800	0.091871	0.406060	0.363318	1.000000

Annexe 4 : Equation à court terme

Dependent Variable: DLNYT				
Method: Least Squares				
Date: 04/06/16 Time: 21:39				
Sample(adjusted): 1985 2013				
Included observations: 29 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNKT(-1)	0.029810	0.028433	1.048430	0.3058
LNYT(-1)	-0.737167	0.063080	-11.68617	0.0000
LNKT(-2)	0.097911	0.011513	8.504417	0.0000
LNLT(-1)	0.018664	0.038203	0.488555	0.6300
DUM94	-0.291157	0.019624	-14.83647	0.0000
DUM97	-0.010859	0.013771	-0.788533	0.4388
C(1)	13.72235	1.329491	10.32150	0.0000
R-squared	0.920538	Mean dependent var		-0.001141
Adjusted R-squared	0.898866	S.D. dependent var		0.060469
S.E. of regression	0.019230	Akaike info criterion		-4.858165
Sum squared resid	0.008136	Schwarz criterion		-4.528128
Log likelihood	77.44340	F-statistic		42.47694
Durbin-Watson stat	1.862737	Prob(F-statistic)		0.000000

REFERENCES:

1. AIFA Emile (2013), Infrastructures publiques et réponse de l'offre agricole au Bénin. Thèse de doctorat. FASEG/UCAD, Dakar.
2. ANDZIO-BIKA Hervé, LEZIN Wilfrid, KAMITEWOKO Edwidge (2004), Role of agriculture in economic development of developing countries:case study of Chine and Sud-Saharan Africa, in journal of agriculture and social research, Vol 4.
3. BANQUE MONDIALE (2008), Rapport sur le développement dans le monde 2008 : l'agriculture au service du développement, Banque mondiale.
4. BASLE Maurice; BENHAMOU Françoise; CHAVANNE, F; GELEDAN A; LEOBAL J; LI- PIETZ Alain (1993) , Histoire de la pensée économique : les fondateurs, Dalloz, Paris.
5. BECKER Gary (1965), A Theory of the Allocation of Time. Economic Journal, 75, 493-517.
6. BLOCK Steven and TIMMER Charles Peter (1994), Agricultural and Economic Growth: Conceptual Issues and the Kenyan Experience, Harvard Institute for Economic Development.
7. CABRAL François Joseph (1997), Rôle des facteurs fixes dans la réponse de l'offre agricole au Sénégal : une analyse par zone agro-écologique, Mémoire de DEA, FASEG/UCAD
8. CARDER Zou-Collines (2013), rapport annuel d'activités, campagne 2012-2013
9. CMPR (Cellule Macroéconomique de la Présidence de la République), (1997), Rapport sur l'état de l'économie nationale : développement récent et perspectives à moyen terme, Cotonou, Bénin.
10. COLOMBO Carlos (1996). Etude de la diversité génétique de maniocs américains (Manihot esculenta Crantz) par les marqueurs moléculaires (RAPD et AFLP). Thèse de Doctorat, ENSAM, Montpellier, France, 144 p.
11. DIAW Adama (1995), Une analyse microéconomique des effets de taxation des revenus agricoles dans les pays en voie de développement, 1-95/04/EP, CREA, Dakar
12. DEGADO Christopher; HOPKINS Jane; KELLY Valérie; HAZEL Peter.; McKENNA Anna; GRUHN Peter; HOJJATI Behjat; SIL Jayashree. et COURBOIS Claude (1998), Agricultural growth linkage in Sub-Saharan Africa, International Food Policy Research Institute, (IFPRI), Research Report 107, Washington, DC.
13. FAO (2013), Produire plus avec moins : le manioc
14. GILLIS Malcolm, PERKINS Dwight-H., ROEMER Michael et SNODGRASS Donald R. (1998), Economie du développement, 4e édition, Nouveaux Horizons, Bruxelles.
15. GOLLIN Douglas, PARENTE Stephen and ROGERSON Richard (2002), The Role of Agricultural in Development. American Economic Review 92(2): 160-164.
16. HAZELL Peter. (2005), Is Agriculture Still Important for Economic Development and Poverty Reduction? IFPRI Forum, USA.
17. HAZELL Peter and RÖELL Ailsa (1983), Rural Growth Linkages: Household Expenditure patterns in Malaysia and Nigeria. IFPRI Research Report 41, Washington, DC.
18. HUFFMAN Wallace (1993), Productivity Indexes and Research, Paper Presented at the AAEA meeting, Orlando, Florida.
19. IRZ Xavier and TIFFIN Richard (2006), Is Agriculture the Engine of Growth?, Agricultural Economics Journal, Vol. 35, Issue 1.
20. JOHNSTON Bruce and MELLOR John (1961), The Role of Agriculture in Economic development, American Economic Review 51(4): 566-93.
21. KASSE Moustapha (1996) : L'Etat, le technicien et le banquier face aux défis du monde rural sénégalais, NEAS/CREA, Dakar.
22. LEWIS Arthur (1955),The theory of economic growth, Homewood, Hill: Richard D. Irwin.
23. MAEP (Ministère de l'Agriculture, de l'Elevage et de la Pêche) (2004), PDRT, étude de la filière manioc, 2004
24. MAEP (2011a), Plan stratégique de relance du secteur agricole
25. MAEP (2011b), Etude économique et financière des chaînes de valeur ajoutée de la filière manioc au Bénin
26. MAEP/DPP (2014), annuaire statistique 2012-2013
27. MALASSIS Louis (1964), Croissance économique et développement rural. Sciences et techniques agricoles. In : Tiers-Monde. 1964, tome 5 n°20.
28. MINAGRIE (Ministère de l'Agriculture et de l'Elevage) (2008), Stratégie Agricole Nationale 2008-2015, Bujumbura, juillet 2008.
29. MOUNIER Alain (1992), Les théories économiques de la croissance agricole, in Economie rurale, Volume 218, Numéro 1.
30. RAFAILLAC Jean-Pierre (1996), La fertilité en zone tropicale humide et le manioc. In : Séminaire sur la fertilité du milieu et les stratégies paysannes sous les tropiques humides, J. Pichot et al. éd., Montpellier, France, ClRAD, p. 286-298.
31. RAFAILLAC Jean-Pierre (1997), Le rô le de la densité de plantation dans l'élaboration du rendement du manioc. In : Actes de la réuni on des agronomes de l'ORSTOM. Montpellier, France, ORSTOM, collection Colloques et séminaires (sous presse).
32. RAJKUMAR Andrew. et SWAROOP Vinaya (2002), Public Spending and Outcomes : Does Governance Matter ?,World Bank Development Research Group, Working Paper N°2840, Mai 2002, 30P.
33. ROMEO M. Bautista. and MARCELLE Thomas (1998), Agricultural Growth Linkages in Zimbabwe: Income and Equity Effects, IFPRI, Washington DC, TMD Discussion Paper N°31.
34. TILAK B.GJandhyala (1993), Education and Agricultural Productivity in Asia: a review, Indian journal of Agricultural Economics, Vol. 48, and n ° 2.