SPATIOTEMPORAL PATTERNS OF ADOPTION OF CASSAVA IN SOUTHEASTERN CÔTE D'IVOIRE, 1951-2017

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ABSTRACT

Cassava is one of the world's leading staple root crops whose adoption for food security varies over space and time in the West African sub-region. Research on cassava has focused on production, processing, post-harvest systems, and diseases with little or no attention paid to spatial variation of its adoption. This study was therefore, designed to analysed spatiotemporal patterns of adoption, factors influencing adoption, and impediments to adoption of cassava in South Eastern Côte D'Ivoire during the period 1951 to 2017. Available information showed that cassava was first cultivated in South Eastern Côte D'Ivoire in 1951.

Adoption of Innovation, Reasoned Action and Planned Behaviour provided the framework, while survey design was adopted. Based on the information provided by the Ministry of Agriculture and Rural Development, the entire 154 villages cultivating cassava in the three districts (Comoé, Lacs and Lagunes) in South Eastern Côte D'Ivoire were purposive selected. Information on cassava growers' associations were provided by Directors of the Ministry of Agriculture and Rural Development in, while the number of farmers in the cassava growers association was provided by officials of each association in villages. A structured questionnaire which focused on socio-economic characteristics, adoption of cassava, factors influencing, and impediments to its adoption was administered to all the 4000 members of the cassava growers' associations in the three districts. Descriptive statistics, Global Moran's I, Trend Analysis, Chi square and Analysis of Variance were used to analyse the data at $\alpha_{0.05}$.

Female cassava farmers were 53.3%, 25.6% were aged between 31 and 40 years, 53.3% were married, 37.7% had primary education, 32.9% had more than five children, and 39.1% earned <121.000 FCFA (220 USD) annually. There was significant clustering of villages adopting cassava in 1951-1960 (I=0.26;z=5.9); 1961-1970 (I=0.25;z=5.8); 1971-1980 (I=0.28;z=6.4); 2001- 2010 (I=0.08;z=2.1) and the entire period 1951-2017 (I=0.05;z=1.3). The number of individuals who have adopted cassava was only 53 before1951 but increased to 1422 in 2017. The number of adopters increased significantly from 1951 to 2017 (R^2= 0.72; F=6.2). Adoption of cassava in the districts was significantly influenced by: age (X^2=483.061), sex (X^2=14.861), marital status (X^2=351.361) annual income (X^2=772.924), educational level(X^2=413.270) and number of children (X^2=218.604). In Comoé district, annual income (X^2=313.499); educational level (X^2=237.131) and number of children (X^2=71.012) were significantly related to cassava adoption, whereas in Lacs district, annual income (X^2=302.581); educational level (X^2=299.157) and number of children (X^2=256.511) were the significant variables. In Lagunes district, annual income (X^2=525.926); educational level (X^2=105.192) and number of children (X^2=151.538) significantly influenced cassava adoption. Financial return (73.1%) was the major reason for cassava adoption by farmers. The impediments to adoption of cassava in the districts were inadequate rainfall, no training on cassava cultivation, difficulty in getting stems, lack of capital and lack of labour.

The pattern of adoption of cassava cultivation in South Eastern Côte D'Ivoire from 1951-2017 was mostly random. Financial gain was the major reason for its adoption. Therefore, more farmers should be encouraged to adopt and cultivate cassava given its contribution to income generation in the country.

Keywords: Cassava adoption, Spatial pattern of cassava, Southeastern Côte d'Ivoire

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CERTIFICATION PAGE

I certify that this research was carried out by **Koffi Jean Marius Boris KOUAME** (SI 196578) in the Department of Geography, Faculty of the Social sciences, University of Ibadan, Ibadan, Nigeria, in partial fulfillment of the requirements for the award of a Ph.D. degree.

02/03/2024

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DEDICATION

This thesis is to Almighty God, my father KOUAME, Koffi Jean Philipe, my mother KOUADIO Kossua Anne-Marie Rebecca, my sisters Armande, Emmanuelle and Bénédicte KOUAME, and my fiancee SAKITI, Doris.

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Koffi Jean Marius Boris KOUAME

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CHAPTER ONE / INTRODUCTION

1.1. Background to the study

Agriculture remains a major element of the economy of most countries in the world, mainly those of sub-Saharan Africa. It contributes to Gross Domestic Product (GDP) and creates jobs for the majority of the population, especially those in rural areas. Cassava, a food crop introduced in Africa in the early 19th century has spread at a rapid rate throughout the region and is playing an important role in food security (FAO, 2012). It is the staple food in many tropical countries in Africa, Asia and America (Egbe *et al.,* 1995).

According to FAO (2011), in 2011 world cassava production estimated at 252 million tonnes of roots out of which, Africa produced 140 million tonnes. In 2005, the European Union imported 5.5 million tonnes of cassava from Africa in the form of tapioca and especially flour for livestock feed. Globally, the main exporter of cassava is Thailand (95% of the world total) with 7 million tonnes sold mainly in Europe, Japan and Israel.

Export among African countries constitutes a little fraction because practically all African countries produce cassava for domestic consumption. West Africa is the most productive region, with Nigeria as the leading producer of cassava with an estimated production of 291,992,646 tonnes. Côte d'Ivoire, occupies the 12th place in the world with a production of 5,367,000 tonnes. Two other African countries, the Democratic Republic of Congo (31,596,046 tonnes) and Ghana (18,470,762 tonnes) are Africa's second and sixth largest producers respectively. Although, Brazil was the initial source of cassava, it occupies the fifth place, with an estimated production of 18,876,470 tonnes (FAO, 2017).

African states, confronted with widespread economic crisis since 1980 and subject to structural adjustment policies, are gradually turning to the creation of agricultural structures. In West Africa for example, certain products such as cassava, rice, groundnuts, tomatoes, yam and maize are being grown. According to FAO (2006), between 1960 and 2005, the share of food crops in agricultural production increased from 71% to 78% in West Africa.

From 1970, states encouraged the development of subsistence agriculture in the face of increasing urban demand, a consumer market and rapid urbanization in Africa. In addition, these products develop in rural agricultural space with large farms oriented to marketing, using large amounts of capital and maintaining close links with input supply chains, processing and marketing channels.

According to Adaye (2009), initially cassava as a plant was not suitable for human consumption in Côte d'Ivoire. Today, cassava has become an important agro-industrial crop and a significant source of income for people living in rural areas. Cassava is the most important crop in Africa, and it provides a similar source of calories as rice (Nweke, 2004). Its drought-tolerance, resilience on marginal agricultural land, and ability to be stored in the ground makes it an important food crop for smallholder farmers (IFAD and FAO, 2000; Sayre *et al.,* 2011).

According to Récensement National des Agriculteurs, (2001), more than 2/3 of the Ivorian farmers cultivate cassava in the southern zone (Côte d'Ivoire) producing the highest in metric tonnes (N'zué *et al.,* 2014). In order to improve cassava production, new varieties developed through research as well as new methods of producing and propagating plant material have been made available to farmers.

The Global Strategy Forum for Cassava Development (Rome, 2000), proposed making cassava more competitive in the domestic and international markets. This forum proposes to develop cassava-based industries through a synergy of strategies and plans at the national, regional and continental levels. Like maize, wheat, and potatoes, which dominate the lucrative global markets for starch-based products, the improvement of cassava production can also become a basic raw material for the preparation of a series of products (Ministry of Agriculture and Rural Development, Côte d'Ivoire, 2017).

The adoption of cassava cultivation in Africa generally and more specifically in Côte d'Ivoire is due to certain factors. According to Balogun (2010), the data relating to the socio-economic characteristics of the producers and the management practices of the plantations are those favouring a greater adoption. Kouakou (2014) asserts that the growth of cassava in Africa and in Côte d'Ivoire in particular is generated by the income and food security potential of the crop.

1.2. Statement of problem

Several studies conducted around the world were on cassava. For most pasts, such studies related to the analysis of biological control of cassava pests (Gutierrez *et al.,* 1988) and study of culture in cassava corridors (Kouadio *et al.,* 2014). Other studies include the spread of African cassava mosaic (Fargette *et al.,* 1984), varieties of cassava, farmers' perception and farm conservation of cassava biodiversity (Akintunde and Obayelu, 2016).

In addition, other studies on cassava have generally focused on awareness, processing technologies (Abdoulaye *et al.,* 2014; Kolawole *et al.,* 2008; Acheampong, 2015 and Mwebaze, 2016) and social implications of the development of cassava. Other studies focused on economics contribution of cassava production, determinants of cassava adoption and factors influencing adoption of cassava varieties (Mbuyamba, 2011; Yakasai, 2010; Adamu *et al.,* 2016; Salum *et al.,* 2016, Awhareno and Ekpebu, 2013, Fermont et al, 2010, Suleman *et al.,* 2012; Atungwu, 2016; Adebayo, 2009; Oguejiofor, 2012; Echebiri, 2008 and Wossen, 2017 and Kouame, 2015). Studies on spatial analysis of cassava (Pancera and Alves, 2015; Mgalamadzi, 2013; Doumbia and Aman, 2014 and Ouattara, 2017).

Cassava contributes to the social and economic development of the farmers by allowing them to be financially autonomous. Adoption is a common phenomenon, and this is reflected in the constant increase in cassava production in Africa and around the world.

Given the significance of cassava as a crop in the study area, a research on its adoption from a spatio-temporal perspective is therefore necessary. Hence, this study seeks to examine the spatial and temporal patterns of adoption and cultivation of cassava in Southeastern Côte d’Ivoire, before1951 to 2017.

1.3. Research Questions

i. What is the spatial pattern of adoption of cassava?

ii. What is the temporal pattern of the adoption and cultivation of cassava?

iii. What are the socio-economic determinants of adoption and cultivation of cassava?

iv. What are the major problems of cassava adoption and cultivation of cassava?

1.4. Aim and Objectives

The aim of this study is to examine the spatiotemporal patterns of adoption of cassava in south-eastern Côte d'Ivoire during the period 1951 to 2017.

The specific objectives are;

(i) Examine the spatial pattern of adoption of cassava cultivation;

(ii) Analyse the temporal pattern of adoption of cassava cultivation;

(iii)To identify the reasons for the adoption of cassava among the socio-economic groups; and

(iv) Examine the spatial variation of the impediments to the adoption and cultivation of cassava.

1.5. Hypotheses

(i) The spatial pattern of cassava adoption is random.

(ii) The number of people adopting cassava varies significantly over the years. This is a significant increase in the number of cassava adopters.

(iii) Adoption of cassava vary significantly among socio-economic groups, and

(iv) The impediments to cassava cultivation varies significantly among the districts

1.6. Significance of the Study

Several studies (e.g. Lecoustre, and Reffye and al, 1988, Egbunike, 1992, and Bonato, 1993) have examined cassava production including biological potential. Others (Saleh, 1999; Alves, 2015; Szyniszewska et al, 2017) have analysed problems encountered in the cultivation of cassava, price fluctuation and cassava diseases.

In addition, writings on socio-economic and diversity of cassava in Brazil and around the world have focused on the role cassava plays in dietary needs and sustainable food security (Babatounde, 1993; Chuzel, 1995; Agueguia et al, 2000. Röling, 2010 and Vidogbena, 2013). However, some of the elements are deserted. These neglected elements include spatial and temporal pattern of cassava.

The existing literature focused on the themes mentioned above and especially the importance of cassava production (Kouakou, 2014; Ayodele et al, 2016. Abdoulaye et al, 2016). Overtime there has been a neglect on the aspect of changes on the adoption and cultivation of cassava. Hence, this study focuses on spatio-temporal pattern of adoption and cultivation of cassava.

This study will be beneficial to the country and allied ministries because it will aid in an understanding of the different steps and levels involved in adoption of cassava especially in Côte d'Ivoire. It will highlight the reasons for adoption and cultivation of cassava, and make recommendations on adoption. It will also establish dynamics that would aid future research in the area of adoption and cultivation of cassava.

CHAPTER TWO / LITERATURE REVIEW

2.1. Introduction

In this chapter, attempts were made to situate the study within relevant concepts of theories of adoption as well as reviews of past studies.

2.2. Concept of Theory of Adoption of Innovations

Rogers (1995) defined adoption as the decision to choose an innovation as the best alternative. It is a process centered on the mental progress of the individual from the first information to the adoption. Van den Ban and Hawkins (1988) conceived the adoption of innovations as the decision to apply them and to continue to use them.

According to Rogers (2003), the adopter has two choices namely: cessation of disillusionment: a decision to reject an idea because of dissatisfaction with its execution and cessation of replacement: a decision to reject an idea in order to adopt the best. The profit of novelty, the risk associated with it are considered among the major factors that influence the decision of producers. Indeed, the more an object gives us pleasure and satisfies us, the more we are willing to invest time and money to acquire it.

An innovation will only be adopted when the individuals concerned are convinced, given the information they have, the interest or the gains they can derive from it. Adoption on the part of these individuals is no longer the result of a social process strictly speaking, but a consequence of their characteristics: a taste for novelty, because they have been taken as target of a strategy (Steyer and Zimmermann, 2004).

Robertson (1971) confirmed the definition and noted that adoption is the use of a new product in a continuous manner and that it is a commitment rather than a trial purchase. For Breton and Proulx (2002), adoption was considered to be the first time of use, upstream of appropriation through use. According to the latter, adoption often comes down to purchase and consumption, whereas use refers to the simple use of a technique in a face-to-face situation with the tool.

This process is apprehended according to the evolution over time of the rate of adoption, i.e the percentage of individuals having adopted the innovation in a given social system. This quantitative conception of diffusion, summed up as the adoption or refusal to adopt an innovation, makes it possible to determine a rate of adoption understood as the rate at which an innovation is adopted by a given social system. Graphically, the evolution of this rate is reflected as Tarde (1980) had suggested, by an S-shaped curve.

Over time, the adoption of innovation logically passes from a small group of adopters to a larger group, then to a pool that is increasingly representative of the general population. This phenomenon leads Rogers to categorize adopters into five profiles based on their speed in embracing innovation as their position on change. The distinguished: innovators are: 2.5%; early adopters: 13.5%; early majority: 34%; late majority: 34% and the laggards: 16% (Figure 2.1)

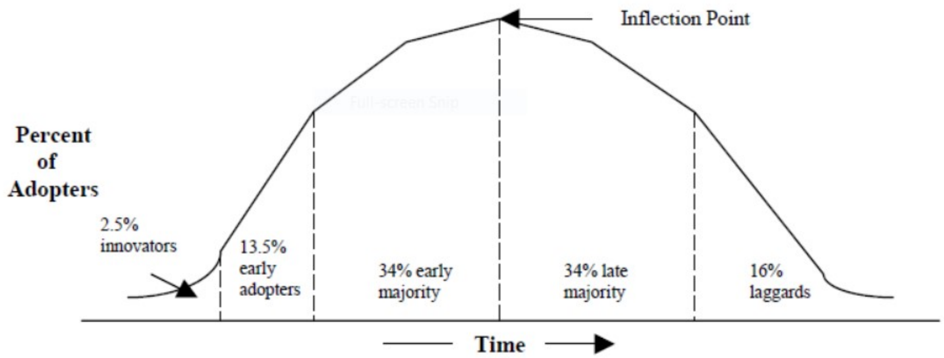

Figure 2.1. The Innovative Character of Adopters as a Function of Time and as a Probability Distribution.

Source : Rogers Everett (1995).

Rogers (2003) envisioned the adoption of an innovation by an individual or organization as a five-step decision-making process ranging from the user's first exposure to innovation, to confirmation or rejection of the adoption of the innovation. At first, the individual becomes aware of the innovation. This is the information phase. During this phase, the media play a central role. Then comes the phase of persuasion; the individual starts to take a position on innovation through the search for information. Rogers gave the family a prominent role during this period. The third step is the decision-making phase at this point the individual engages in activities that enable him or her to adopt or reject the innovation. During the implementation phase, which is the fourth stage of the process, the individual tries to innovate by using it on a daily basis and thus evaluates it. Finally, comes the confirmation phase where the individual seeks information that reinforces his choice of adoption or refusal of innovation.

According to Rogers (2003), an innovation is spread and adopted by a community if the individual finds interest in it, if it is perceived as superior to what it tries to substitute. This interest depends mainly on the characteristics of the product (its relative advantage, its compatibility with the values of the group of membership, its complexity, the possibility of testing it and its visibility), the characteristics of the consumers (material, cognitive and social resources) and profile of adopters.

Rogers (1995) developed the theory of the adoption of innovations as shown in Figure 2.2. It is widely used in studies of adoption of innovations and diffusion of technologies. He analysed the behaviour of adopters of an innovation and developed a theoretical model of diffusion of innovations within organizations. It highlights four key elements in the process of diffusion of innovations namely:

1- Innovation

It is based on the fundamental question of why some innovations spread faster than others. According to Rogers (1995), the characteristics of the innovation explained its adoption. These characteristics were; relative advantage, compatibility, complexity, testability and observability. The relative advantage is the capacity in which an innovation is perceived by potential "adopters" to be better than the existing one. This degree can be measured economically in terms of satisfaction or social prestige factor (Rogers, 2003). Compatibility is the degree to which an innovation is perceived as a

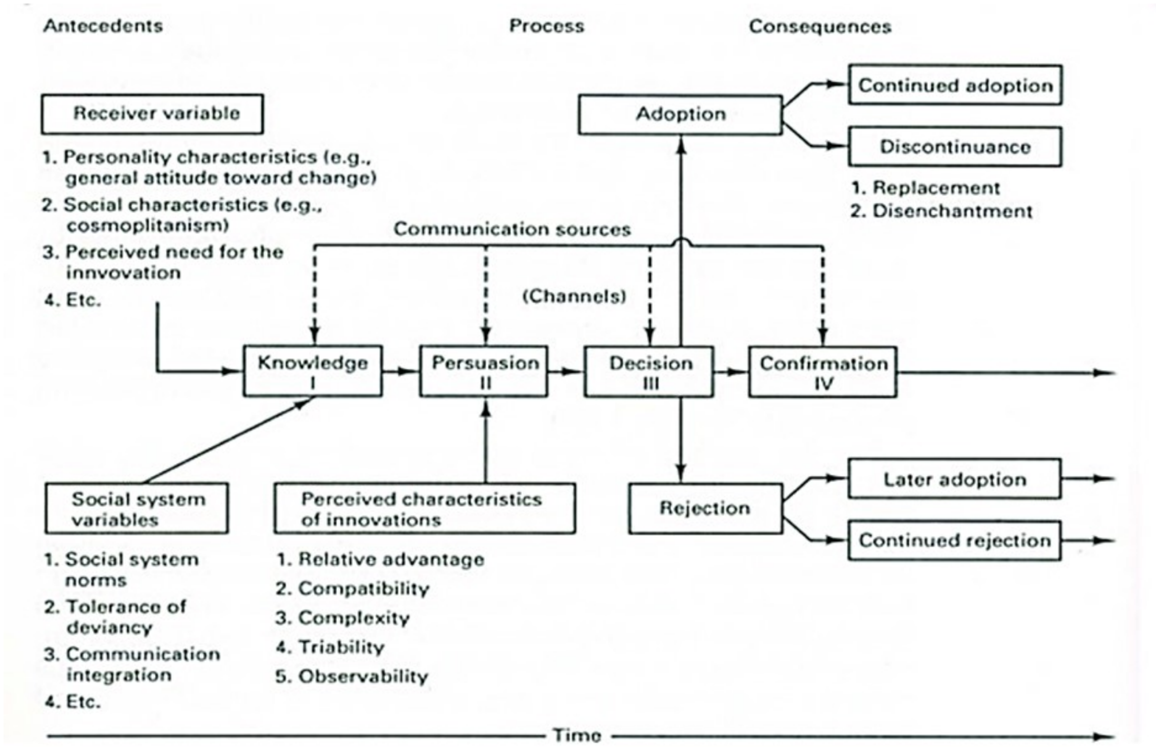

Figure 2.2. The Adoption process according to Rogers.

Source: Rogers Everett (1995).

compliant with the values, experiences and needs of potential "adopters". Complexity is the degree to which an innovation is perceived as difficult to understand and use. In this sense, the more complex an innovation is perceived to be, the less one may try to adopt it and vice versa (Handfield and Pagell, 1995). Testability is the degree to which an innovation can be tested on a limited field before it is used. Thus, an innovation that can be tested beforehand is less risky for the individual who wants to adopt it. Finally, observability is the degree to which the results of an innovation are visible. Thus, the more visible the results, the faster it will be adopted.

2- Communication Channels

Communication is a process in which participants create and share information for the purpose of mutual understanding (Rogers, 2003). The main function of these communication channels is to ensure the transmission of the message from the source which could be individual or institution to the receiver. According to Rogers (1995), adoption is a very specific form of communication linking, through innovation, two individuals or units of adoption.

3- The Social System

According to Rogers (2003), the social system is a set of interacting units, engaged in the process of solving a problem and pursuing a goal in common.

4- The Time

Time is an important factor in the diffusion process. Indeed, time is involved in the diffusion process mainly at two levels. On one hand, time is involved in the decision-making process with regard to innovation "innovation-decision-process". It is a mental process by which an individual moves from first knowledge of innovation to form attitudes towards innovation, with the aim of decision whether to adopt or reject an innovation, to implement it and to confirm that decision. The Rogers model adoption and dissemination process is in five phases: knowledge, persuasion, decision to adopt or not to adopt innovation, implementation, and confirmation (Figure 2.2).

On the other hand, time is involved in dissemination as the ability of an individual or unit of adoption (relative to others) to adopt an innovation more quickly (Rogers, 2003). Rogers (1995) pointed out that an innovation spread on the society through a process that reaches different categories of consumers or potential users from the most enthusiastic to the most reluctant to innovate. In this case, Rogers distinguishes five types of adopters of innovation.

The innovators are on the lookout for all the novelties. According to Rogers, they represent about 2.5% of the potential user population. Early adopters display characteristics close to innovators, while being more closely linked to the rest of the population. This portion of the potential user population is critical to the success of an innovation. In fact, reaching them makes it possible to obtain a critical mass of users according to Rogers; they represent about 13.5% of the population. It is also, in this segment of the population that we find the majority of opinion leaders who can influence the behaviour of other potential users. The early majority is the population's portion of potential users who adopt the innovation only when it has already proven itself and achieves lower price levels. They represent 34% of the population. The late majority is composed of those who adopt innovation when the majority of the population is already equipped. They represent 34% of the population. Latecomers are rather worried about risk and their financial constraints but prefer access to innovations when they reach low price levels. They represent about 16% of the potential user population.

Socio-economic factors are therefore elements that can also influence the diffusion of innovations. Indeed, these factors relating to the social and the economy are related. Studies on adoption and dissemination have shown that people perceive certain socio-economic variables crucial in adopting technology (Rogers, 1983). These variables are living space, age, gender, household size, farm equipment; farm size etc. These variables that characterize the socio-economic situation of producers can be decisive in the adoption of agricultural innovations.

Many authors have shown that individual characteristics are crucial in adoption. The most cited of these characteristics include age, education level, above-average income, membership of a social network (Conte, 1999; Nguyen and Phan, 2000; Pohjola, 2003;

Singh, 2004; Chin and Fairlie, 2004; Bagchi and Udo, 2007; Farrell and Shafika, 2007; Kovačić and Vukmirović, 2008).

Other studies have shown that the number of years of experience in agriculture as head of household is a continuous variable that should positively influence the probability of adoption (Adesina, *et al.,* 2000). Similarly, the cost of technology (Afomassè *et al.,* 2004); gender (Singh, 2001; Lethiais and Poussing, 2004; Gefen and Stratiff, 1997; Vankatesh and Morris, 2000) and socio-professional activity (Allegressa and Di Maria, 2003) are also crucial in adoption.

In summary, the agro-ecological zone, age, gender, household size, farm equipment, farm size, level of education, above-average income, number of years of experience in agriculture, the cost of technology and socio-professional activity are crucial in the adoption of a technology.

In Europe, in the field of industries, 90% of innovations fail on the European market (Andreani, 2001). While innovating is fundamental for a company in order to achieve success, social change is regarded as a vector (Rogers, 1962) and any social change is likely to encounter resistance from the social system concerned. One could then think that the social system concerned does not reject the innovation itself, but the social change induced by it. Bajoit (2006) considers that there are four major modes of social change.

1- Evolution

Evolution is the first mode of change (it prepares the conditions for the existence of the other modalities; all changes therefore go through a period of evolution). This is the result of non-biological members of a company's actions.

2- Reform

The reform implies the search for a change by an "organized collective" (following numerous negotiations between actors) and it results from a collective decision. Following the reform can result in either a revolt or a revolution.

3- Revolt

The revolt arises during confrontational exchanges following a "spontaneous mobilization" of the members of a social group. The great difference between evolution and revolt is the character of the solidarity between the members of the group concerned ("affective" solidarity for the evolution and "ostentatious" solidarity for the revolt).

4- Revolution

The revolution is the only modality of social change where the solidarity between the members of the group is organized. It engages, like the revolt, in a process of conflict.

As we have seen, there are four types of social change according to literature, possible in a society. These four types of change are different according to two criteria: the degree of solidarity and the degree of organization. As regards the evolution or the reform, the change is gradual, because the rest of the members of the group welcomes the individuals' decisions positively, one will speak about a mutation. On the other hand, when the actors are moving towards revolt or revolution, it is because they face the rejection of peers. Social changes constantly affect today's societies through mutation or rupture. These social changes are necessary for the evolution of society and practices. One may wonder, however, whether social changes in a society cannot cope with a certain resistance of individuals.

There is a perception that any force that creates stability in social systems is a resistance to change in the sense of Kroon (1997). From a broader point of view, the tendency to preserve, protect and always return to a state of equilibrium is relatively positive. Botha *et al.,* (1998) identified four reasons for resistance to potential social change within a social system.

Norms do their best to ensure harmony between individuals. These norms are imposed on individuals within a given social system and those who do not respect them will be considered deviant (Becker, 1963). These standards are shared, they can not be modified or abolished easily. They can not be changed by one individual.

- Cultural cohesion: the basic configuration of social systems emphasizes cultural cohesion of individuals. It seems so complicated to change part of the social system without changing the whole thing.
- The untouchable subject in some cultures certain current activities change easily. Among those that do not easily change their daily activities, resistance to change would be greater. Moreover, it has been noticed that there is a subject

that provokes one of the greatest resistances to social change: subjects in relation to what is holy.

- Resistance to strangers (lato sensu): most social changes come from outside, being in contact with other people, other civilizations can lead to social change. Resisting contact with strangers is like resisting change. Social change is an important sociological phenomenon that finds its source in many causes, whether endogenous or exogenous.

This approach to social change allows us to realize the impact of such a change within a system;structural and functional changes do not go unnoticed and completely change the way people live. It is therefore to be assumed that resistance to change is a recurrent phenomenon in our present society.

2.3. Theory of Reasonable Action

Figure 2.3 shows the theory of Reasonable Action (Fishbein and Ajzen, 1975) which is one of the most popular theories used and is about one factor that determines behavioural intention of the person's attitudes toward that behaviour.

Fishbein and Ajzen (1975) defined "attitude" as the individual's evaluation of an object. They defined "belief" as a link between an object and some attribute, and they also defined "behaviour" as a result or intention. Attitudes are affective and based upon a set of beliefs about the object of behaviour.

A second factor is the person's subjective norms which is perceived by the individual's immediate community's attitude to certain behaviour. As for the attitude, it allows the evaluation of the behaviour in the favourable or unfavourable direction (Ajzen, 1991).

The attitude can be negative or positive. However, it is based on behavioural beliefs, that is, the subjective assessment of the consequences of behaviour (positive or negative value) and the strength of their belief (Ajzen, 1988, 1991, 2005).

The positive or negative dimension is described after Fishbein and Ajzen (2010) as instrumental (notions of utility and reward) and experiential (notions of pleasure and boredom). The other aspect is the subjective norm. The latter, according to Ajzen (1991), is the society that influences behaviour, i.e. the adoption and its cultivation. Indeed, social pressure felt the immediate environment is a factor of adoption.

This social pressure can be family, friends, neighbourhood or other social groups or actors (Ajzen, 1988). In spite of everything, there are inadequacies especially in the prediction of the behaviour since this prediction is influenced by a good number of factors.

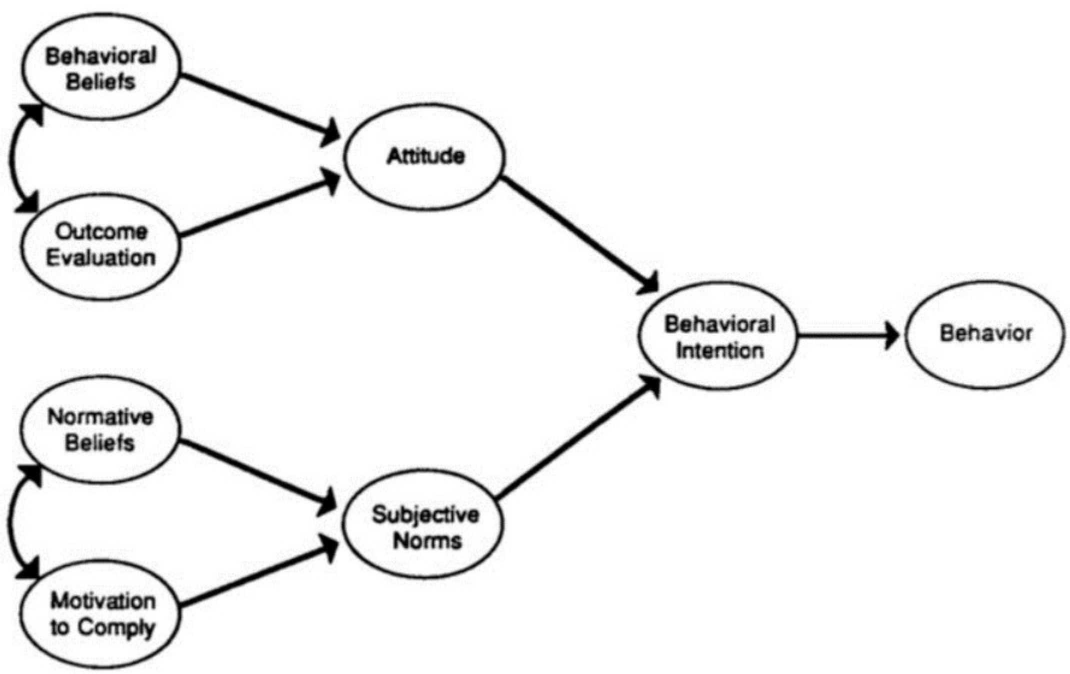

Figure 2.3.The Theory of Reasonable Action.

Source: Fishbein and Ajzen (1975).

2.4. Theory of Planned Behaviour (TPB)

Ajzen (1991) developed Theory of Planned Behaviour which is about the factor that determines behavioural intention of the person's attitudes toward that behaviour as shown in Figure 2.4. The first two factors are the same as Theory of Reasonable Action (Fishbein and Ajzen, 1975). The third factor is known as the perceived control behaviour being the control which users perceive as a factor which may limit their behaviour. This theory aims to explain and predict the behaviour of humans in specific contexts. This prediction according to the author is accompanied by determinants (subjective attitudes and norms).

At the determinants level, the author focuses on perceived behavioural control as shown in Figure 2.4. Indeed, perceived behavioural control is a perceptive variable in the level of understanding (difficult or easy) of behaviour or innovation and results from control beliefs. This variable consists of external conditions (opportunities) that facilitate, moderate or hinder the individual's ability to adopt certain behaviours and the individual's perception of his or her resources and ability to achieve them (Ajzen, 1991).

The perceived behavioural control has a direct influence on the behaviour of the individual provided that the perception of control is realistic Ajzen (1991). For the author, a perception is said to be realistic if the actual control the person on the behaviour makes it possible to predict the probability of success of the behaviour.

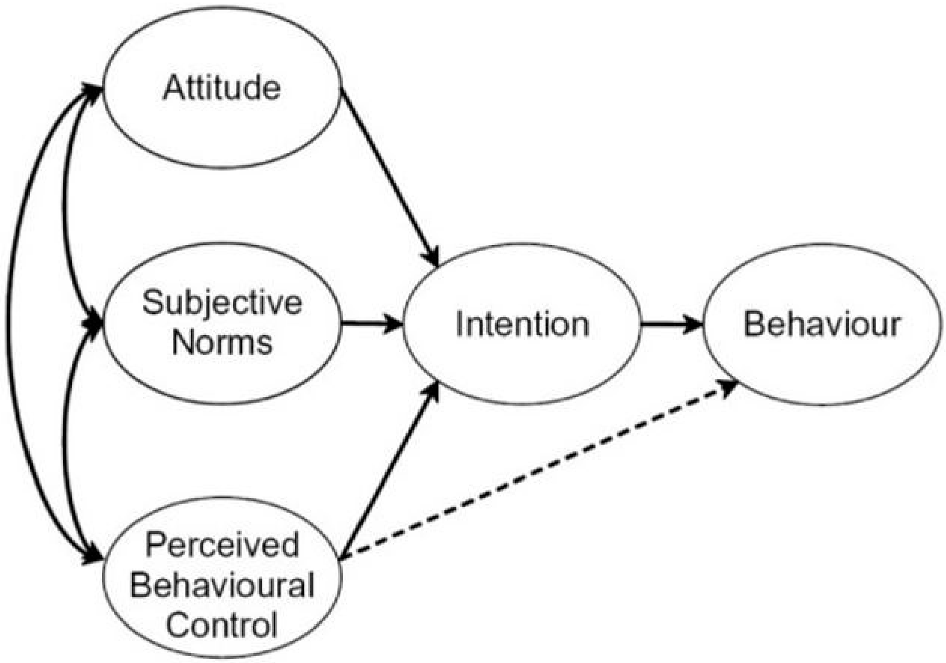

Figure 2.4. Schematic Representation of the Theory of Planned Behaviour..

Source: Ajzen (1991).

A general theory of innovation diffusion had not yet been formulated; it is unlikely that any concise statement could cover diffusion the structural process and cultural scales of analysis. Because these three components differ in scale, they also vary in what is to be explained or simulated, the methods deemed suitable and the sort of evidence which is acceptable. One scale may be more appropriate than others for a particular purpose, yet all three are needed to give a full appreciation of diffusion.

2.5. Agricultural Innovation and Adoption

The adoption of agricultural innovation concerns the rational behaviour of the agricultural producer . With this, a producer has the option to choose between the various innovations. In justifying Negatu and Parikh's (1999) model of simultaneous equations, a combination of approaches were employed to examine the decision, and the adoption of a new variety of corn. Indeed, the authors showed that the size of the household and income explains the adoption of the new variety. Furthermore, the variety was perceived to be in high demand alongside the increase in the availabilty of fertilizers, thus reflecting a high level of adoption.

This is why Savadogo et al, (1998) show that the non-agricultural incomes and the size of the agricultural household have a positive impact on the probability of adoption of the animal haulage in the zones Guinean and sudano-sahelien climate of Burkina-Faso. They conclude that the use of the animal haulage improves the marginal productivity of the factor work and the agricultural outputs and that the simultaneous recourse with the animal haulage and manures induce the best of results.

Another example is that of Madagascar. Randrianarisoa and Minten (2003) insist on the adoption of manures. However, it is not possible on behalf of the farmers because the latter are more afraid of the innovation and perceive it as a the form of risk. Moreover, Harvey and McMeekin (2005) were of the opinion that it is necessary to carry out the reorganization of the systems of research to make progress which implies that it must be adapted and to take account of the local situations. The risk was regarded a long time as the principal factor which reduced the rate of adoption of new technology (Rosenberg 1976; Lindner 1987). That is why, Marra (2003) proposed to distinguish the various elements from risk in the decision-making process like the training (*learning*) and the perception of the producers of the distribution of the probabilities present and future of profits and losses of technology, covariance of the profits between the old and the new technology and the times of return on investment of technology.

Shapiro et al (1992) concluded that adopting them could have a behavioural sedentary than not adopting them finally, the perception of the risk is a factor more determinant than the attitude towards the risk. These elements highlight the difficulties with certain process of adoption.

Malton and Spencer (1984), quoted by Lamers and Feil, (1997) affirmed however that the weak rate of adoption of innovations by the peasants is explained partly by the lack of comprehension institutions and of research screw-a-screw the problems of the peasants. On the other hand, the differences show the lack of information and sensitizing of the peasants to the innovation. According to Feder and Coll (1985), several organizations of agricultural research explain the weak rate of adoption of innovations by the performances of the laws of the market like the existence of inappropriate policies on agriculture.

2.6. Historical evolution of cassava adoption

Cassava *(Manihot esculenta Crantz)* is native to tropical America, where it has been cultivated for about 4000 years (Sauer, 1951). De Candolle (1886) and Vavilov (1951) asserted that the region of origin of cassava was eastern Brazil, while Sauer (1952) favoured savannahs in Venezuela. Rogers (1963), based on the extensive collections of South America, hypothesised at least two geographical origins, one located in eastern and southern Mexico and Guatemala, the other in North-East Brazil.

Cassava has spread to tropical and sub-tropical regions in many parts of the world and is now widely grown in Africa, India, Indonesia, Malaysia, the Philippines and Thailand. It seems that cassava was introduced to Africa by the Portuguese in the late 16th century via Sao Tome. The spread of cassava was initially slow and its cultivation unimportant until the beginning of the 19th century. In Nigeria, north of the Niger Rivers, it was unknown before the First World War (Jones, 1959).

Cassava became one of the main food resources of the coastal plains of Ghana at the beginning of the 19th century and reached the Ashanti region and the north of the country in the early 1930s (Doku, 1969). On the East Coast of Africa cassava was introduced to the island of Reunion in 1736, and from there to Madagascar. Its presence in Zanzibar was noted in 1799. Before 1850, it was very small inland in East Africa, except near Lake Tanganyika, which it had reached from the West. Stanley (1878) noted its presence in Uganda in 1878. The area under manioc grew considerably during the 1950s and is grown in Africa more than any other continent.

In West Africa, cassava was introduced at a number of points along the West African coast during the sixteenth century from the Gambia River to Nigeria. The Portuguese had established their forts, counters and colonies on the continent, and by the end of the 17th century cassava was present in most of these regions or places. In contrast to Central Africa, the spread of cassava in West Africa was widespread, and the expansion of cultivation took place largely in the late 19th and 20th centuries. The main reason was the human geography and political organization of the West African kingdoms, which differed remarkably from those of the kingdoms of Central Africa. The wet coastal belt was largely uninhabited, and formed a peripheral zone around continental capitals (Jones 1959).

In spite of this, there are occasional references to the adoption of cassava in various parts of West Africa before the nineteenth century. Although cassava seems to have been absent along the Gold Coast (Ghana) in the early 15th century, it was largely cultivated around Accra in 1785 (Wigboldus, 1984).

In Côte d'Ivoire, cassava came from Ghana in the late nineteenth century and it migrated into Côte d'Ivoire via south-eastern Côte d'Ivoire with the Akan /Ashanti ethnic groups (Adaye, 2009).

It is a perennial shrub from 1 to 4m in height, and is cultivated for its edible roots rich in starch and for its equally edible leaves. The propagation mode in culture is the stem cuttings. A cutting emits roots at the nodes in contact with the moist soil and at the base (more numerous basal roots). The adequate annual rainfall for cassava cultivation ranges from 600 to over 4000mm (FAO, 2008). It is also grown in the equatorial zone in recent forest clearings. The minimum temperature is 12°C, the maximum growth rate is between 25 and 29°C. However, weak radiation, a strong wind, and a strong pluviometry before uprooting can be unfavourable to the production (Perrin, 2015).

Cassava grows best on light, sandy soils with good drainage and medium fertility. This plant is less demanding with average yields sometimes on soils very poor in nutrients. Saline soils, strongly alkaline and subject to moisture stagnation are unsuitable for growing cassava. As for the rocky soils, they hinder the formation of storage roots. Finally, it can survive prolonged periods of drought. Root harvesting usually starts from six months to one year after planting and depends on the variety of cassava.

Average yield was around 10 tonnes/ha and vary according to variety, edapho-climatic and cultural conditions. For the two categories of cassava distinguished: on one hand, the roots are dried and then generally transformed into "tapioca" (cassava) and on the other hand, sweet cassava. The roots are directly consumable without risk and are the most consumed in tropical Africa. These varieties are different in their acid content and are referred to respectively as *M. utilissima and M. dulcis.* The hydrogen cyanide content is higher for the first where it can reach 250 milligrams per kilogram of fresh roots according to Grace (1977).

2.7. Significance of Cassava

The spatial distribution of cassava and its evolution in terms of spatial production is shown by Fonds des Nations Unies pour l'Agriculture et l'Alimentation FAO (2008). Indeed, cassava is now widely grown and harvested as an annual plant in the tropics and subtropics. This crop is widespread in tropical Africa, Asia, and Latin America. It is the fourth most important crop in the developing world, with an estimated production of 226 billion tonnes in 2006. According to FAO data (2013), world production of cassava was 28 million tonnes (FAOSTAT).

The top five producing countries (Nigeria 53 Mt, Thailand 32 Mt, Indonesia 24 Mt, Brazil 21 Mt and the Democratic Republic of Congo 16.5 Mt) provide more than half of the world's cassava production. As for Côte d'Ivoire, it is the 23rd largest producer in the world, with 2.4million tonnes according to FAO (2013).

A joint study conducted by FAO and Perrin (2013) focused on the evolution of world cassava production by continent from 1993 to 2013. Indeed, the share of Africa in global production has increased by 50 to 56% over the last twenty years and the quantity produced has doubled in 20 years, thanks to the spectacular growth of some African countries, notably Angola (+ 780%), Ghana (+ 170%), Mozambique (+ 185%), Malawi (+ 2130%) and Sierra Leone (+ 1485%).

The development of cassava cultivation is what Kouame (2015) called the "white gold" revolution. Indeed, the plant engaged more population and especially those of rural areas in the cassava sector, that is from production to consumption. Due to production increase each year, the agricultural sector takes into account the advantages and the economic benefits of cassava in tropical Africa and Côte d'Ivoire in a specific way. ANADER (2007) affirmed that cassava in the zone of the southern Côte d'Ivoire alone covered more than 70% of the Ivorian agricultural territory. This production allowed it to occupy the 2nd national position in the field of food after yam, the 5th in West Africa and the 12th at the African level.

This constantly evolving production has an impact at the spatial level. As asserted by Leener and Treutens (1987), supported by N'Dabalishye (1995), the spatial development of cassava is due to the fact that this crop has the capacity to adapt to climatic disturbances, hence its strong presence at the spatial level in African food production. In addition to its low cultural requirements, other aspects of its development are discussed by some authors.

Others authors such as Chaléard (1988), opined that cassava owed its strong growth in both production and space to the high demand for foodstuffs caused by economic growth and its corollary, namely urbanization. It is for this reason that the Bureau National d'étude Technique de Développement-BNETD report (1998) argued that the spatial development of cassava is due to the birth of urban centers where its consumption in different forms is very advanced because, in fact, more than 80 food products come from cassava cultivation Sustainable Food Security in Central West Africa (SADAOC, 1999).

In addition to this diversity of cassava products, its favourable cost to households in the market is also another determining factor in its valuation. According to FAO (2004), much of the cassava production is consumed in sub-Saharan Africa as cassava is a staple food for most people. Indeed, FAOSTAT data reveal that among the thirteen largest cassava users in the world, nine are Africans among whom the RDC (République Democratique du Congo) and Nigeria account respectively for 15.2 and 14.6% of global consumption. This was estimated at 104 million tonnes in 2003, 2 million more than in 2002. In 2003, world utilization of cassava in animal feed was 54.5million tonnes, about 4% higher than in 2002. This increase is explained by the evolution of the situation in the world. Europe, China, Viet Nam and Malaysia where the scarcity of cereals and the consequent rise in prices relative to substitutes have led to increased use of cassava in livestock feed.

In addition to feeding animals and humans (direct), cassava is also used in industries. In 2003, cassava production increased and expanded in Viet Nam, in fact, alcohol production had increased in production and rapid economic growth. The industrial use of cassava has also increased in Ghana, the Republic of Korea, Singapore, Hong Kong, the Philippines and China (FAO, 2004).

According to the dictionary Grand Robert (2005), dynamics (spatial) is a process that marks an evolution, a profound, radical and often rapid change. It is similar to the transformation affecting a society, economy or space (the term spatial refers to space). Precisely, this is an agricultural space.

Renard (2002) reviewed the transformations that the campaigns have undergone over time. Indeed, the campaigns are undergoing changes at several levels, on one hand, through the transition from subsistance agriculture (for consumption), to mechanization of agriculture, and on the other hand, the transformation of agricultural areas intended for production in urban areas of which residential and recreational functions become important, as is the case in developed countries. In addition, subsistance agriculture long had its goal as self-sufficiency. Thus, for Haubert (1999), the changes undergone in subsistence farming show the capacity of farmers to adapt to natural crises (impoverishment of soil), economic conditions and local conditions (land saturation, etc.).

The question of the mutation of the landscape had been the object of reflection of Chaléard (1996). Indeed, in the agricultural landscape "Baoulé" of the large AKAN group, cassava competed spatially with yam, which is a dominant subsistence and commercial food crop. Moreover, the growth of cassava as a commercial crop is due to the growth of the town of Bouaké, which is causing a change in the rural environment. Besides, the development of the commercial food supply goes hand in hand with the urbanization of the cities of the South (Third World), since the growth of the commercial foodstuff benefits both worlds: rural and urban (Chaleard and Dubresson 1999).

This new activity modifies the surrounding spaces of large cities that are occupied by food crops. Moreover, for Chaléard (1996), the agricultural landscape is dominated by food crops in certain regions, to the detriment of export crops in crisis. It is in this perspective, Diomande *et al.,* (2009), showed the changes in the region of N'zi-comoé.

Indeed, this region is a forest-savannah transition zone commonly called "V-Baoulé" the development of the crops depends on the rainfall regime. However, since 1968 there had been a decline in rainfall in the area and this had the consequence of modifying its agricultural landscape. Export crops such as coffee and cocoa lose space for crops such as rice and cassava in terms of adaptation mechanisms; cashew nuts and rubber (cash crops) are gradually replacing cocoa in forest areas.

In the savannah region, peanuts and cassava emerge at the expense of rice and corn, so the old-fashioned arboricultural landscape of coffee and cocoa is not recognized. In addition, Bredeloup (1993) asserted that village populations have abandoned the lands of the Dimbokro region to migrate to the west and south-west of Côte d'Ivoire. The result of this migration is the isolation and abandonment of the countryside (the disappearance of certain markets) thus, Dimbokro no longer produces; it consumes and supplies itself in a non-peripheral space.

For several decades, the plantation economy vegetates and restructures the Ivorian space by deviation to the west of the coffee and cocoa production areas, which upset the food trade circuits. Producer and consumer areas of plantain a by-product of cocoa farmers has disappeared. At present, supplying the population of Dimbokro with bananas requires the establishment of a transport organization and more sophisticated technical operations than in the past thus; a new spatial borrowing with a strong dominance of food crops emerges. In addition, there is an increasingly growing presence in the agricultural landscape of the rubber tree plantations, the oil palm plantations and the cashew plantations, which contribute to the transformation of agricultural landscape and modification of operating systems and social reporting.

Nevertheless, the crisis in the ex-cocoa loop has encouraged the introduction of new perennial plants in order to revitalize the region's economy. The opening of the rubber tree plantations, the oil palm plantations, the teak anchovy plantations and the development of rice cultivation have reduced the benefits of the coffee and cocoa areas, thus contributing to the modification of the agricultural landscape. Usually this agrarian transformation in most cases accompany a modification of farming systems oriented more and more towards agricultural intensification and a change in the economic and social role of young people and women. Noufe (2014) opt cited (Mazoyer, 1987; and Roudart, 2002) argued that agriculture is shaping and transforming the landscape since the Neolithic agricultural revolution, men have been constantly deforesting, planting, burning, ploughing, cutting, etc., shaping their natural environment in order to derive the resources necessary for their survival. Similarly, according to Brou (2005), the mutation of the landscape is a result of the combination of several factors currently changing in the environment, which have upset man-nature relations in African peasantry, thus raising the question of mutations.

It is therefore in this perspective that it defines it as the interaction between the components of geographical space in rural areas we have three main systems, namely the ecosystem, the agro-system, and the socio-system. These systems maintain subsystems according to the author, thus leading to a change in the visible landscape in both forest and savannah. In this context, the consequence is of more important forest zone. The new landscape dominates the risk of water stress and disappearance of dense forests. The landscape is predominantly fallow, crop and secondary forest, preservation of sacred forests and finally the crucial fact is the great uses of shallows formerly abandoned. These aspects best reflect the spatial dynamics of south-eastern Côte d'Ivoire.

According to Brou (2005), the current environmental evolution imposes profound changes in rural communities. It refers to the spatial mobility of the agricultural population, land management methods, land access, cropping methods, crop types, etc. These processes were at the origin of the dynamics of forest and savannah formations. From an agro-economic point of view, the disappearance of the forest ecosystem leads to a structural blockage of the Ivorian agricultural system (Brou, 2005). This is why Léonard *et al.,* (1996) opt cited (Brou, 2005) indicate that the exhaustion of forest reserves no longer allows the reproduction of the agrarian society by propagation of the pioneer fronts. This should take place in an enclosed space.

As a result, compelled farmers set up production systems that do not rely on the existence of "pre-forest" capital, for both food crops and perennial crops this part of the study allow understanding specifically the spatial dynamics. In this zone, export crops were cultivated, such as coffee and cocoa, which gave an arboriculture lease on agricultural land through export crops. However, after deteriorating conditions, there is a new spatial configuration of south-eastern Côte d'Ivoire.

2.8. Perception of Cassava

The propagation of cassava in the world has been the subject of several studies. Authors have been interested in the reasons for production (adoption), cultivation (motivation) and the perception of cassava among producers (peasants).

From these writings, different motives emerge. Kouame (2015) states that farmers are looking for crops that can provide them with substantial income indeed, it is impossible to speak of substantive income without speaking of marketing because according to Abbot (1962) marketing is a capital factor in relation to productivity.

The commercialization of cassava contributes to the socio-economic development of women (Essoh, 1988). The sale of products derived from cassava allow African women, and particularly women of rural communities and that of the region of N'zi comoé to have an annual income ranging from 200,000 FCFA to 500,000 FCFA allowing them to build homes and caring for their respective families (Kouame, 2015). This financial autonomy, as shown by Essoh (1988), allow women to have a place in the African village society and, above all, in the family and social structure after they have been excluded from the production process of olive oil.

However, as Adiko (1994) demonstrated that more men are interested in cassava cultivation because it is an important sector of the economy. Ricau (2016) rightly claimed that with 7milion tonnes in 2014, Thailand which is the world's largest exporter of cassava has males involved in the cassava circuit.

Cassava for some African countries has become market-oriented and considered not just a traditional food crop but a cash crop (Chaleard, 2003). It is from this angle that the Ivorian State has resized the cassava sector in Côte d'Ivoire which creates the commission (cassava and derivatives) to support the traditional manufacturing know-how of cassava products. For this, the Ivorian government has put in place a strategy to increase processing for a total amount of 1.675 billion FCFA. This project has three components including the environment and regulation for a cost of 1.04 billion FCFA. It aims at formalizing, structuring the cassava sector, introducing mechanization systems in plantations and promoting modern industrial-type exploitation. The second component is related to investments estimated at 340 million FCFA. It should support the mechanization of the various stages of cassava processing, improve the quality and productivity as well as promote the transport of cassava derived products. Finally, the last part focuses on capacity building. The State went through the training of actors in the sector, to promote good practices, support research, and development in financial terms and in technology transfer (Ministry of Agriculture and Rural Development, 2016).

It is in this sense that FAO (2003) attaches particular interest to cassava cultivation this structure perceives cassava as an essential element in food security given its role in several African countries, particularly because of its resistance to drought.

The growth in world production in 2002 is mainly due to Africa, where nearly 100 million tonnes were harvested (3% more than in 2001). Given the financial revenues generated by cassava, Rwanda has particularly favoured its development. In 2003, production increased again by 4.35% over 2002 to 192 million tonnes of fresh roots (FAO, 2003).

2.9. Impediments to Cassava Adoption and Cultivation

Like any other crop, cassava is experiencing difficulties both in its practice and in its adoption. Kouame (2015), demonstrates cassava as food crops are grown on forest clearing. For Hédin (2016), when cassava is cultivated in the dry season, it is observed that a large number of cuttings are destroyed by the termites. However, when cassava is grown in the rainy season, farmers are concerned about the rot of the cuttings. Cassava is a plant that requires a lot of attention from the farmers. For this reason, the respect of the cultural calendar is of paramount importance to the farmers.

The workforce is increasingly rare in rural areas, as a result, some farmers are forced to make small plantations to be able to take care of their family (Kouakou, 2014). Despite this, Hedin (2016) supports that cassava has the reputation to deplete the land as a result. How can a less demanding crop deplete the land? This is possible as Kouakou (2014) shows that, cassava cultivation is mostly done in Africa on poor soils and exporting a large number of fertilizers that are not returned to the ground by the failure to meet set-aside dates (Douka, 1981).

Another problem limiting the adoption of cassava cultivation is phytosanitary problems indeed, according to the FAO (1988), cassava presents symptoms of diseases, these diseases are sometimes caused by viruses. The immediate consequence is the reduction of cassava production. In East Africa, this disease has devastated cassava production in many countries and threatened the food security of people (FAO, 2003).

Beside these diseases, there is the presence of rodents (Kouame, 2015). They attack different parts of the plant and the damage is visible causing loss of yield. The author argued that in addition to the health factors affecting the cassava crop, there are also other factors that the author has called "human factors largely due to lack of political will". These are the factors that the reporter *Confénrence des Ministres de l'Agriculture de l'Afrique de l'Ouest et du Centre (CMA/AOC, 2003)* highlighted and summarized as follows: first, the problem of processing and transportation network.

In West and Central Africa, cassava processing is essentially important, only 1% is found in processing industries. In addition, there is poor access to production areas which sometimes contributes to the destruction of cassava in the farm with a poor road network. Secondly, there is a low investment rate for cassava cultivation indeed, in recent years in West and Central Africa advances in research have been very weak in cassava productivity. Less than 1% compared to 2-5% for maize, wheat and rice. Thirdly, Kouame (2015) demonstrated the fluctuation of the purchase price of cassava. Several factors condition the fixing of the purchase price of cassava depends on several aspects. For example, in Côte d'Ivoire in the N'Zi comoé region, the price of cassava at the edge of the field is not the same as that in the markets.

The lack of price regulation on cassava cultivation is one of the fundamental problems facing farmers. This situation does not encourage them to market cassava and farmers prefer to leave their cassava in the plantations than to market them at ridiculous prices.

CHAPTER THREE / RESEARCH METHODOLOGY

3.1. Introduction

This chapter discusses the methodology used in accomplishing the aim and objectives of this study. Research design, Data collection and data analysis are provided.

3.2. Research Design

This section describes the empirical and analytical approach applied in the study of the spatial and temporal patterns od adoption od cassava in southern eastern Côte d'Ivoire. The surveys were conducted in 2017. This study focused on three districts in the south-eastern part of Côte d'Ivoire.

Both spatial and social methods were used to understand the spatio-temporal patterns and the also the socio-economics charateristics of adoption of cassava in south-eastern Côte d'Ivoire. The spatial methods helped to create an understanding of the changes in spatial and temporal dimensions of adoption. Geospatial technologies were used to the first research objectives (1). The Social methods refers to the anlaysis of data related to the reasons for adoption of cassava among the socio-economic groups and the impediments to adoption and cultivation of cassava. This method focused on research objective II, III and IV.

Social Data were collected through in depth Key Informant Interview (KII), Focus Group Disscusion (FGD) and Questionnaires survey (QS). The aim of appling this methond is to understand the perception, reasons or motivation of adoption of cassava and also the to assess a link between the government with the empirical evidence on cassava adoption.

3.3. The Study Area

3.3.1. Location and site description

Côte d'Ivoire is located between 4° 30 and 10° 30 north latitude. 2° 30 and 8° 30 west longitude with an area of 322 462 km^2 as shown in the Figure 3.1. It is bounded on the west by Liberia and Guinea; in the north by Mali and Burkina Faso; to the east by Ghana and to the South by the Atlantic Ocean over a distance of 550 km (Figure 3.1).

The south-eastern Côte d'Ivore, which consists mainly of plateaux, has five relief regions. These are:

- The Guinean ridge
- The Northern plateaus
- The Transition zone
- The Interior lowlands
- The Coastal fringe

In Côte d'Ivoire, the Decree No. 2011-263 of 28 September 2011, concerning the organization of the national territory divides the country into districts and regions. There are two autonomous districts these are Abidjan and Yamoussoukro , 12 districts and 30 administrative regions.

This study focused on the districts of Lacs, Lagunes, and Comoé. These three districts covers a land mass of 65.455km^2 according to Institut National de la Statistique (INS, 2014) with 13.675km^2 for the district of Comoé, 23.280km^2 for the district of Lagunes and 28.500km^2 for the district of Lacs.

Figure 3.1**. Location of the Study Area.**

Source: Researcher (2017).

3.3.2. Soil and Geology

The soil in the study area is predominantly ferralitic, consisting of shale rocks with a high risk of erosion during heavy rain, especially for the districts of Lagunes and Lacs. These soils are derived from the decomposition of calc-alkaline granites in the north and metamorphic shales in the south.

Alluvial soils are also found in shallow areas and wetlands. For districts like Lagunes and Comoé, the soils belong to the group of highly leached ferralitic soils. It consists of;

- Ferralitic soils on eruptive and metamorphic rocks (granite, shale and basic rock), with good water retention especially in the southern part of the districts.
- Ferralitic soils on tertiary sand and the poor quality of these soils is composed by their depth large enough to make them arable.
- Soils developed on quaternary sand on which only coconut cultivation is feasible. These soils are found along the coast and the lagoons.
- Much smaller hydromorphic soils such as valleys and lowlands.

However, the district of Lacs has a peculiarity in its soil level. In fact, these soils have undergone a very advanced chemical decomposition by the action of man. The quartz is transformed (total hydrolysis) and replaced by clay (kaolinite), iron hydroxides (goethite) and the aluminum.

These soils are conducive for cassava cultivation. In fact, as Hédin (2016) shows. Cassava thrives on sandy soils with good drainage medium fertility and adequate sunlight. It has modest requirements for soil fertility and provides good yields on acidic soils that are nutrient-poor and unsuitable for growing other plants. Saline soils, strong alkaline and soils subject to moisture stagnation are unsuitable for growing cassava. The rocky soils, in turn, hinder the formation of storage roots.

The fresh organic matter, despite its abundance, is completely degraded in Côte d'Ivoire (Hedin, 2016). The progressive degradation of soils linked to the intensification of exposure has been made. In some places, they are covered with ferruginous cuirasses exposed to sunlight and desiccation which makes them hard and form lateritic cuirasses. They are red due to high concentration of iron oxides and the newly formed clays are abundant with different pH in places.

Finally, the soils in the study area are becoming chemically poor (Kouakou, 2014). Though, it is favoured for the development of food crops, especially cassava which demands less water. Soil replenishment is being done progressively for the districts of Lagunes and Comoé, given the acceptable rainfall in this area. On the other hand, in the Lacs district, soil degradation is becoming increasingly accentuated by human pressure and the instability of rain.

3.3.3. Climate

According to FAO (2009), cassava can survive prolonged periods of drought or low frosts. In this case, the nutrients stored in the storage roots allow the plant to survive.

The planting of cassava cuttings carried out almost year-round, just a few drops of rain can ensure recovery. When this plantation takes place during the dry season, a large number of cuttings are destroyed by termites. In the rainy season, the ease of recovery of cuttings allow planting space over most of the year and as a result, harvesting can be done when the need arises almost without interruption. However, it seems that the most favorable time for planting is in March, from the first rain of the intense rainy season. Populations in southeastern Côte d'Ivoire tend to plant closely so that cassava covers the soil well.

The climate is warm and humid sub-equatorial type characterized by rainy seasons and dry seasons that alternate during the year. Rainfall is less important in the northern part than in the southern part of the study area, which has a significant rainy season during the months of May and June.

The northern part of the study area is subject to the tropical transitional climate. The rainy season is from May to October with a maximum concentration in the month of August. Precipitation varies between 900 and 1200mm during the year. Outside the wet period, especially between December and February when the harmattan blows, the air is dry and this causes an increased cooling during the night.

The diurnal thermal amplitude can then reach 20°C. The climate is subject to the equatorial transition climate, the rains are lower in the southern part of the study area and are distributed differently over the year. The dry season, which runs from November to March, precedes the wet season or the rainfall which varies between 1200 and 1500mm during the year. Two maxima are observed during the months of June and September. The south is also subject to the ‘‘soudanian climate’’ and thus undergoes a bimodal regime: a short dry season between August and September and a small rainy season between October and December; a long dry season between December and February and a long rainy season between March and July. The later period is characterized by an average rainfall of up to 1900mm.

Since the climate have a relation with rainfall, downpour in the south-east of Côte d'Ivoire is the most important, especially in rural areas despite its spatio-temporal variability. However, there is a constant irregularity and decrease in the annual rainfall. The south-eastern part of the study zone is experiencing an irregularity that is sometimes acceptable, allowing farmers to have an average quantity that allows them to develop agriculture, in this case, cassava. In central northern part of the study area, rainfall irregularity is increasingly accentuated, which results to decrease in annual heights. This rainfall rarity is due to the impoverishment of the precipitation-carrying air mass as it advances inland and also to the type of vegetation that is encountered.

Finally, since cassava is a highly demanded plant, richness of the soil in nutrients is important. It is a plant that can adapt to poor soils and arid climates. This rusticity, combined with its multiple food uses, makes it an important food crop in southeastern Côte d'Ivoire with considerable adoption by rural populations.

3.4. Data collection

The collection of data was done at five levels. These are national level, districts level, regional level, departmental level and village level (Figure 3.2).

3.4.1. Secondary data

Secondary data were collected at the national, district, region and departmental levels.

- **National level**

Information on the quantity of cassava production in each district, population of cassava farmers in district and the name of villages that cultivate cassava were obtained at the headquarters of the Ministry of Agriculture and Rural Development of Côte d'Ivoire in Abidjan. This information was very useful and served as a guide in further collecting information based on the territorial organization and decentralized structures of the Ministry of Agriculture and Rural Development.

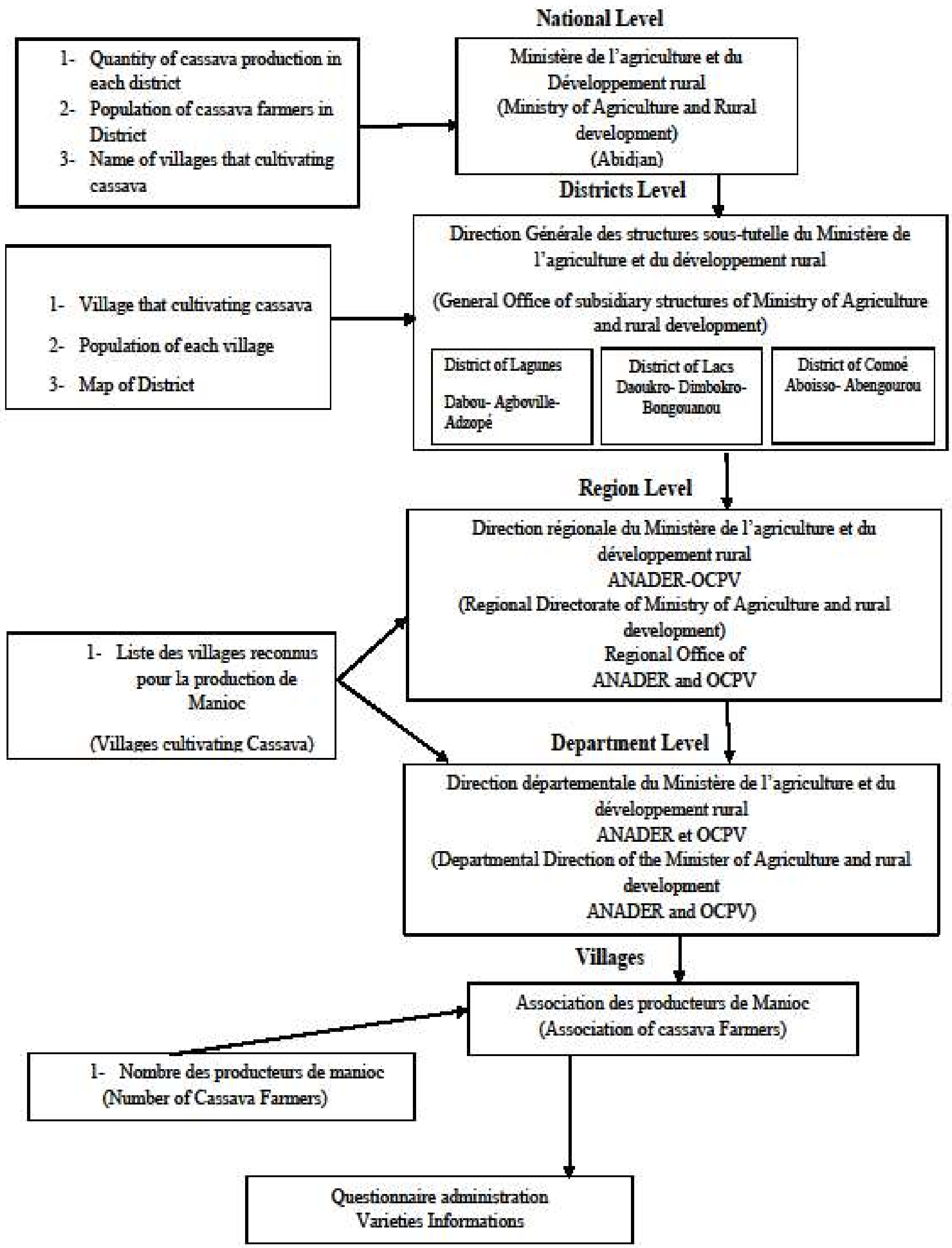

Figure 3.2. Stage of Data Collection.

Source:Researcher (2017).

- **Districts level**

The meetings with Ministry of Agriculture and Rural Development's directors confirmed that south-eastern Côte d'Ivoire was a major cassava producing area. Visits and meetings were conducted in the district headquarters of the three districts in order to have more specific information related to the research. Thus, in each district, we obtained information on cassava growing village, the population size of each village and the district map.

The district level, the structures under the supervision of the Ministry of Agriculture and Rural Development (ANADER), a structure that deals with the Cassava Growers' Associations in each district and *Office d'Aide à la Commercialisation des Produits Vivriers (OCPV),* which supports the marketing of food products. The population obtained at the district level by the *Institut National de Statistiques* (INS) in its decentralized directions showed there was an increase per village.

- **Region and Department Level**

According to the hierarchy in data collection, regions and departments were also visited. At the regional level, the regional directorates of the structures of the Ministry of Agriculture and Rural Development provided information on the list of villages recognised for their production of cassava.

3.4.2. Primary Data

- **Questionnaire survey**

A questionnaire survey was the main source of primary data. The questionnaire survey was at the village level (Tableau 3.1). A sample of the questionnaire used is in Appendix1. The questionnaire was designed to capture information on cassava adoption and cassava cultivation. The questionnaire (Appendix I) was divided into three sections. The first section sought information on the farmers such as the district of origin and their socio-economic characteristics (age, sex, marital status, level of education, annual income and number of children). The second section focused on cassava adoption and its cultivation. In this section, an inquiry was made about the following "when did they start cassava cultivation, the reason of cassava adoption, the farm size, the cassava assistance provided, and management." The last section focused on the problems of cassava adoption and cultivation and its association with other crops.

Table 3.1. Distribution of Sample respondents and Sampled villages.

Districts	Total Number of Villages	Populations	Selected Villages	Sampled respondents
Lacs	836	1,266,415	50	1,341
Lagunes	513	1,478,047	41	1,201
Comoe	364	1,203,052	53	1,458
Total	**1713**	**3,947,514**	**154**	**4,000**

Source: Ministry of Agriculture and Rural Development, Côte d'Ivoire (2017).

3.5. Choice of Sample Villages

South-eastern Côte d'Ivoire comprising of Lacs, Lagunes and Comoé districts, has 1,713 villages according to the *Recensement Général de la Population de l'Habitat (RGPH, 2014).* The list of the villages producing cassava were given by *Agence National d'appui pour le développement Rural (ANADER) and Office d'aide à la Commercialisation des Produits Vivriers (OCPV)* under the Ministry of Agriculture and Rural Development. Thus, 154 villages were selected and constitute our sampling (Table 3.1,).

3.6. Choice of respondents

The respondents' list was obtained from the association of cassava farmers in three districts. (Tableau 3.1).

All the cassava farmers were administered. Copy of number of cassava farmers respondents in the three districts as shown in (Appendix III).

3.7. Techniques of Data analysis

Descriptive and inferential statistics were used in this study. Cartographic methods were also used.

3.7.1. Descriptive analysis and Cartographic methods

Descriptive statistics analysis such as frequency and percentages were used to present data in a tabular format. For cartographic methods, charts and graphs were used to present data graphically to aid visual comprehension of the analysed data.

Data from the questionnaire were imputed into Microsoft (MS) Excel and IBM SPSS (Statistical Package for Social Sciences) version 20. The frequency distribution of data generated depict the percentage, frequency and cumulative percentage.

3.7.2. Inferential statistical analysis

The following inferential statistics: Global Moran's Index (I), Analysis of Variance (ANOVA) and Chi-square test were used to test the formulated hypotheses.

Moran's I analysis was carried out on ArcGIS 10.4; Trend Analysis was carried out on Microsoft Excel version 2016; while ANOVA and Chi square Analysis were carried out using IBM SPSS (Statistical Package for Social Sciences) version 20.

Research objective I: GPS is used to analysis the data obtained. The data obtained were analysed using spatial statistical technique (Global Moran 'I'); with attributes such as number of adopters in each village considered for this study, as well as number of adopters over the years.

Research objective II: The data used to achieve this objective; obtained from the questionnaire survey in the study area across the 154 villages.

Research objectives III and IV, were organized, analysed, summarized and interpreted using descriptive statistics and inferential statistics. The data collected and analysed using the questionnaire survey.

Furthermore, utilization of tables and column charts was to show the distribution of variables as the respondents' stated and curled from the questionnaire.

- **Hypothesis Testing**

Hypothesis I: The spatial pattern of cassava adoption is random

<u>Test statistic:</u>The hypothesis was tested using the spatial autocorrelation tool (Global Moran's Index). The Spatial Autocorrelation (Global Moran's Index) tool measures spatial autocorrelation based on both feature locations and feature values simultaneously. Given a set of features and an associated attribute, it evaluates whether the pattern expressed is clustered, dispersed, or random. The tool calculates the Moran's I Index value and both a z-score and p-value to evaluate the significance of that Index. P-values (probability values) are numerical approximations of the area under the curve for a known distribution, limited by the test statistic.

The Spatial Autocorrelation (Global Moran's I) tool is an special/inferential statistic, which means that the results of the analysis interpreted within the context of its null hypothesis (Haining R, 2001). For the Global Moran's I statistic, the null hypothesis states that the attribute being analysed is randomly distributed among the features in the study area; in other words, the spatial processes promoting the observed pattern of values is random chance.

$$I = \frac{N}{W} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

where $N$is the number of spatial units indexed by i and j; x is the variable of interest; $\bar{x}$ is the mean of x; w_{ij} is a matrix of spatial weights with zeroes on the diagonal (i.e. w_{ij} = 0); and $W$is the sum of all w_{ij}.

The coordinates of the villages were obtained using the Global Positioning System device during the field survey. The obtained coordinates were then imported into the ArcGIS 10.5 software for the calculation of Moran's Index. The Global Moran's Index were employed for this study and it was computed for different selected years ranging from pre-1951 to 2017. Attributes such as the name of the village, number of adopters in the village were tied to the coordinate of each village and this aided the computation of the Global Moran Index. The analysis was conducted first for the different years respectively (10 years period) and the result of the analysis for each year is presented afterwards. The same test was carried out on the total input based on the recognized districts which were used as the units of analysis.

Hypothesis II: The number of people adopting cassava varies significantly over the years

Test statistic: This hypothesis underwent a test using the one-way analysis of variance.

The One-way Analysis of Variance statistical test was used to examine the variation in the number of adopters among the years (8 classes of years) across the district.

Hypothesis III: The reasons for the cassava cultivation vary significantly among the socio-economic groups.

Test statistic: This was tested using Chi-square. Chi-square test is a nonparametric test used for two specific purposes: (a) to test the hypothesis of no association between two or more groups, population or criteria (i.e. to check independence between two variables); (b) and to test how likely the observed distribution of data fits with the distribution that is expected (i.e., to test the goodness-of-fit). Used to analyze categorical data.

Firstly, the socioeconomic characteristics of the respondents were examined. Secondly, cross-tabulation was done for the demographic (Age, Sex, Marital status, Annual income, Education level and Number of children) characteristics of respondents and the reasons of cassava adoption and its cultivation (Financial reason, Food and consumption, cultivation by ethnic group and government encouragement) then the Chi-square test of independence was carried out to investigate the significance of the observed variation.

Hypothesis IV: The impediment to cassava cultivation varies significantly among the districts

Test statistic:This hypothesis was tested using one-way analysis of variance for the variation of impediments to cassava adoption and cassava cultivation across the study area using the district (154 villages) as units of analysis.

Analysis of Variance (ANOVA) is a hypothesis-testing technique used to test the equality of two or more populations (or treatment). Through the means of examining the variances of samples taken. ANOVA allows one to determine whether the differences between the samples are simply due to random error (sampling errors) or whether there are systematic treatment effects that causes the mean in one group to differ from the mean in another.

The variation of impediment to cassava cultivation across socioeconomic characteristics were achieved using cross-tabulation analysis and Pearson's Chi-square Test.

CHAPTER FOUR / RESULTS AND DISCUSSION

4.1. Introduction

This chapter presents the result of analyses and discussion based on the objectives of this study. The chapter is divided into four main section; (1) Spatial pattern of cassava adoption; (2) Temporal pattern of adoption of cassava; (3) Reasons for adoption of cassava; (4) Impediments to adoption and cultivation of cassava in south eastern Côte d'ivoire.

4.2. Spatial pattern of cassava adoption

The spatial pattern is anaylsed on the basis of nine time periods. These are:

4.2.1. Before 1951

Figure 4.1 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire before 1951. There is a high concentration in the south-east corner and northen part of the study area. However, in the south-west there is no concentration of cassava adopters. Instead, a dispersed pattern exists. As Figure 4.1 shows, the high concentration of more than three adopters per village is found in the south-eastern corner and north-eastern part of the study area. Also, a concentration of two adopters per village is located in the central part of the region. Villages in the south-west typically have less than two adopters each.

Only 31 villages out of the total (154 villages) number of villages considered had adopted cassava. There are more adopters in Lacs district than in Lagunes.

In Comoé district, 9 villages out of 53 villages had adopted cassava. In Lacs district, 19 out of 50 villages adopted cassava before1951. The number of farmers recorded in this district ranged between one and two. Finally, in Lagunes district, only three villages out of 32 adopted cassava. All the villages had one adopter each.

At the district level, there is a cluster in the southern part of Comoé district, while in the central and northern part of Comoé district a dispersed pattern exists. In Lacs district, the concentration can be observed in the north-west and south-central part. Finally, in Lagunes district, there is a sparse presence of cassava adopters in the eastern, southern and northwestern part during the pre-1951 period.

In Comoé district there are five villages with three adopters per village located in the southwest, central and north of the district. At the central district, there are two villages with four adopters. At the northern end of the district, there are two villages with a total number of five adopters in the northern area.

In the northern area of district of Lacs, there are four villages with two adopters per village and six villages with one adopter per village. In the the southern area of the Lacs district, there are two villages with two adopters per village and seven villages with one adopter per village. Finally in the district of Lagunes, there are three villages across the district with one adopter per village located at the south, east and west of the district.

The results obtained from the descriptive analysis of the Figure 4.1 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

The Moran's Index (figure 4.2) statistics computed for before 1951 revealed that the spatial pattern of cassava adoption for that year set is random as revealed by a I=-0.019138 "p" value of 0 and a Z score range of +1.96 to -1.96. Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is accepted for this year.

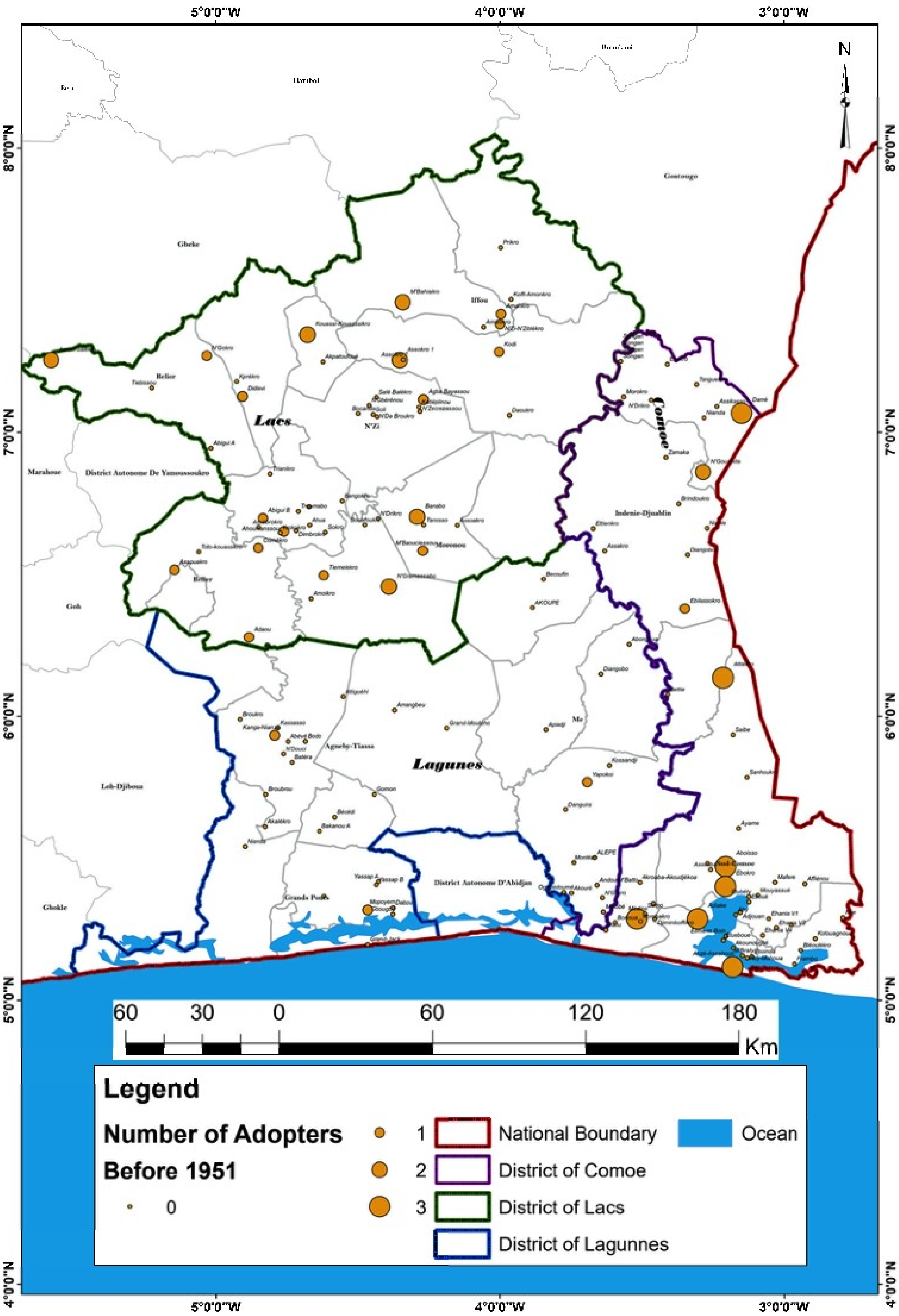

Figure 4.1. Spatial pattern of cassava adoption before 1951.

Source: Researcher's Fieldwork (2018)

Hypothesis test result

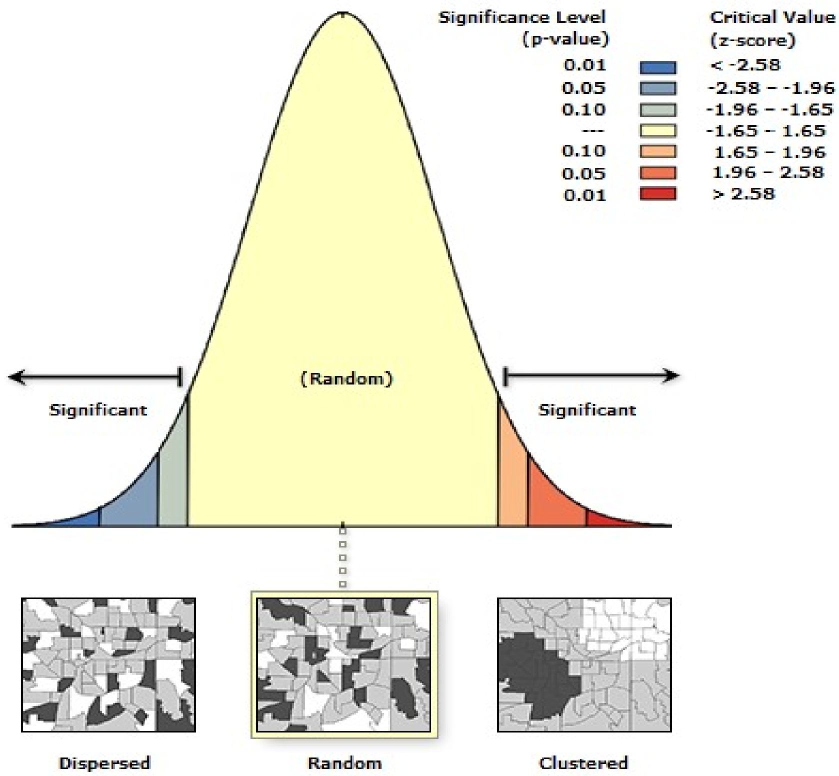

Figure 4.2. Moran's I statistical analysis result before 1951

Source: Researcher's Analysis (2018).

4.2.2. Between 1951 and 1960

Figure 4.3 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 1951and 1960. There is a high concentration in the north-west, central-west and south-east part of the study area. However, in the central part there is no concentration of cassava adopters; instead, a dispersed pattern exists.

As Figure 4.3 shows, the high concentration of more than three adopters per village is found in the northern and north-western part of the study area. Also, a concentration of two adopters per village is located in the central part of the region. Villages in the south-east, central and south-west typically have less than two adopters each.

Only 50 villages out of the total number of villages considered (154 villages) had adopted cassava. There are more adopters in Lacs district than in Lagunes. In Comoé district, 9 villages out of 53 villages had adopted cassava. In Lacs district, 34 out of 50 villages adopted cassava between 1951 and 1960. The number of farmers recorded in this district ranged between one and three. Finally, in Lagunes district, 7 villages out of 41villages had adopted cassava. All the villages had one adopter each.

At the district level, there is a cluster in the northen part of Lacs district, while in the central and northern part of Lacs district a dispersed pattern exists. In the Comoé district, the concentration can be observed in the south and central part. Finally, in Lagunes district, there is a sparse presence of cassava adopters in the western and southern part during the perdiod between1951 and 1960. In Lacs district there are six villages with three adopters per village located in the northen, central-west of the district. At the northern and southern part of the district there are four villages with a total number of eight adopters (respectively two adopters per village). In the northern area of district of Comoé, there are two villages with one adopter per village and seven villages with one adopter per village located at the central and southern part of the district. Finally in the district of Lagunes, there are six villages across the district with one adopter per village located at the south, west and north-east of the district.

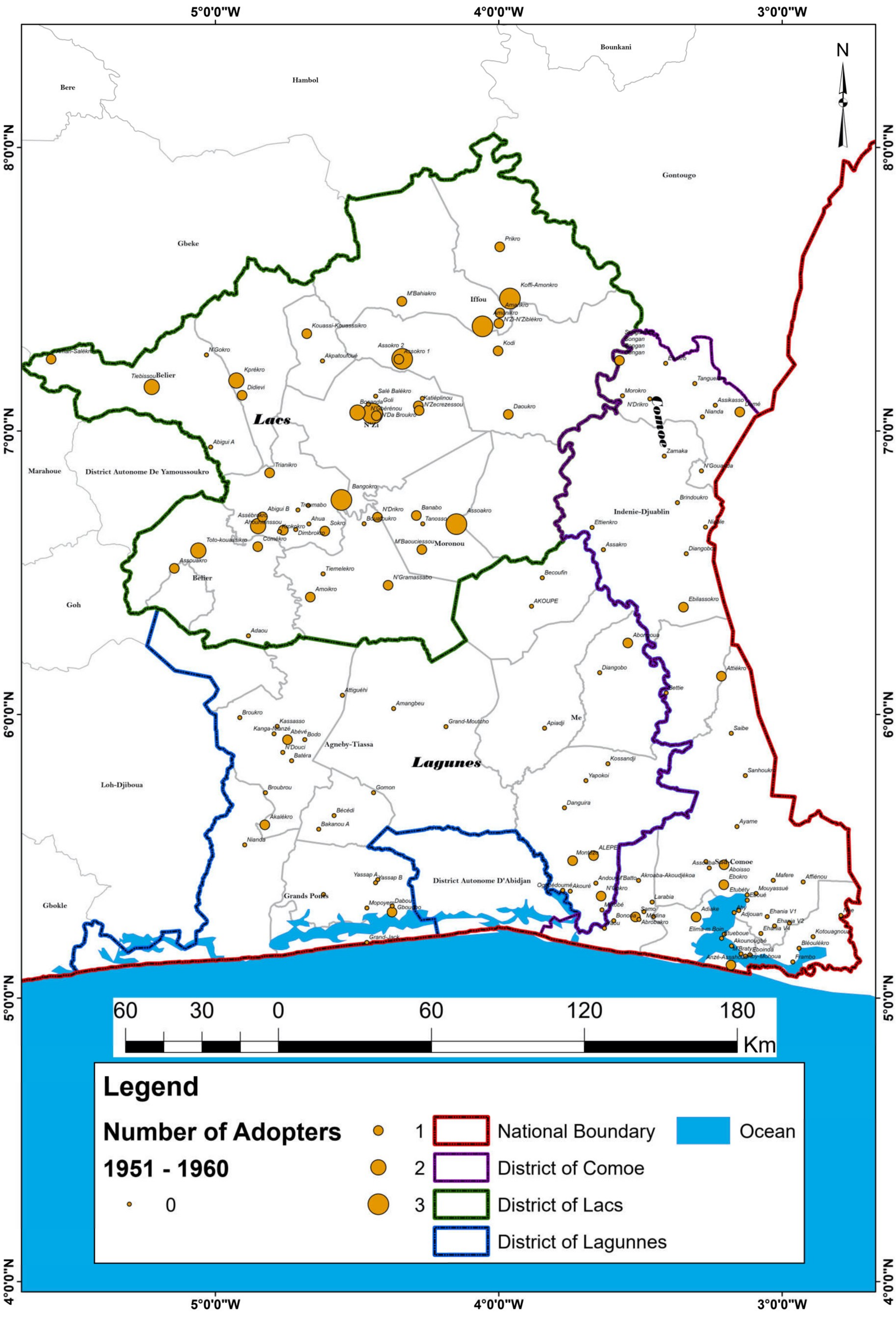

Figure 4.3. Spatial pattern of cassava adoption between 1951 and 1960.

Source: Researcher's Fieldwork (2018).

Hypothesis test result

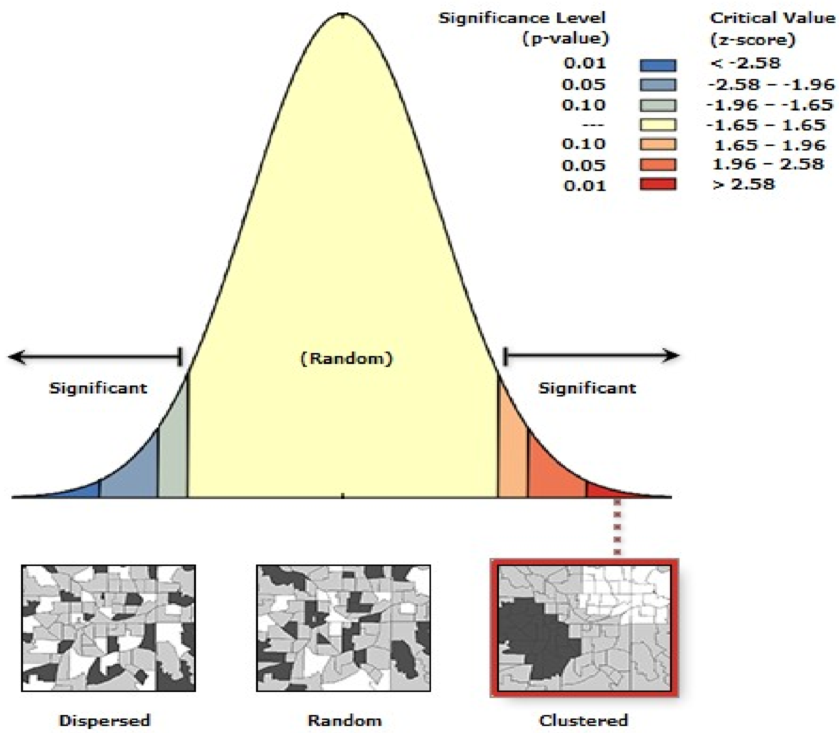

Figure 4.4. Moran's I statistical analysis result 1951 and 1960.

Source: Researcher's Analysis (2018).

Results obtained from descriptive analysis of the Figure 4.3 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.4 indicates the Moran's Index statistics computed for the pattern of adoption between 1951 and 1960. Based on the figure, there is a significant clustering of cassava adoption for between 1951 and 1960 as revealed by a I= 0.260145 "p" value of lesser than 0.05 and a Z score range of 1.96 to 2.58.

This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa.

The number of adopters for this year seem to be highly clustered at the southern end of the Comoé district where adopters are mostly 1, and also at central Lacs district where the number of adopters ranged between 2 and 3 adopters. Further, it might also be attributed to the fact that since the district of origin is the Comoé district, it is expected that there should be a clustering around the region based on the law of diffusion.

Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is rejected for this year.

4.2.3. Between 1961 and 1970

Figure 4.5 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 1961and 1970. There is a high concentration in the north-west, central-west and south-east part of the study area. However, in the eastern part, there is no concentration of cassava adopters; instead, a dispersed pattern exists.

As Figure 4.5 shows, the high concentration of three adopters per village is found in the northern part of the study area. Also, a concentration of two adopters per village is located in the central part, south and west of the region. Villages in the south-east, and east typically have less than two adopters each.

Only 68 villages out of the total number of villages considered (154 villages) had adopted cassava. There are more adopters in Lacs district than in Lagunes.

In Comoé district, 8 villages out of 53 villages had adopted cassava. In Lacs district, 41 out of 50 villages adopted cassava between 1961 and 1970. The number of farmers recorded in this district ranged between one and three. Finally, in Lagunes district, 19 villages out of 41villages had adopted cassava. All the villages had one adopter each.

At the district level, there is a cluster in the northen southern and central part of Lacs district, while in the eastern part of Lacs district a dispersed pattern exists. In the Comoé district, the concentration can be observed in the south part. Finally, in Lagunes district, there is a cluster presence of cassava adopters in the western and southern part during the period between 1961 and 1970.

In Lacs district there are one villages with three adopters located in the north of the district. At the central and southern part of the district there are nine villages with a total number of 18 adopters (respectively two adopters per village). In the northern area of district of Comoé, there are three village with one adopter per village and also, five villages with one adopter per village located at the southern part of the district. Finally in the district of Lagunes, there are six villages across the district with two adopters per village located at the east, south, west and of the district while, 13 villages with one adopter each is located at the eastern, central and north-west part of the district.

The results obtained from the descriptive analysis of the Figure 4.5 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

The Moran's Index statistics computed for the pattern of adoption between 1961 and 1970 (Figure 4.6) revealed there is a significant clustering of cassava adoption (I= 0.258459 "p" value of lesser than 0.05 and a Z score range of 1.96 to 2.58). It can be observed that the number of adopters for this year seemed to be highly clustered at the southern end of the Comoe district where adopters are mostly, and also at central Lacs district where the number of adopters ranges between 2 and 3 adopters. Hence, the hypothesis is hereby rejected for this year and the alternative hypothesis is accepted.

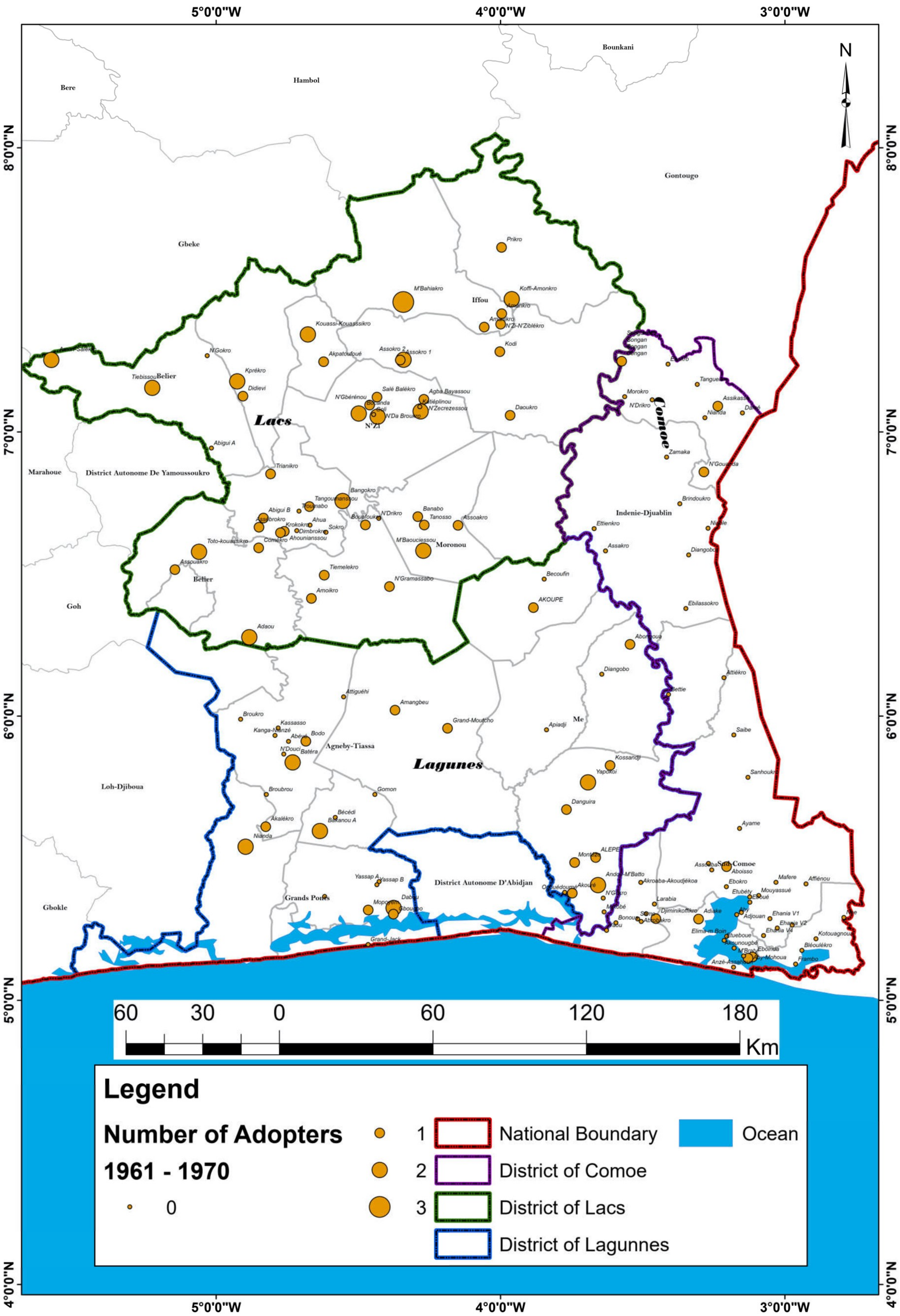

Figure 4.5. Spatial pattern of cassava adoption between 1961 and 1970.

Source: Researcher's Fieldwork (2018).

Hypothesis test result

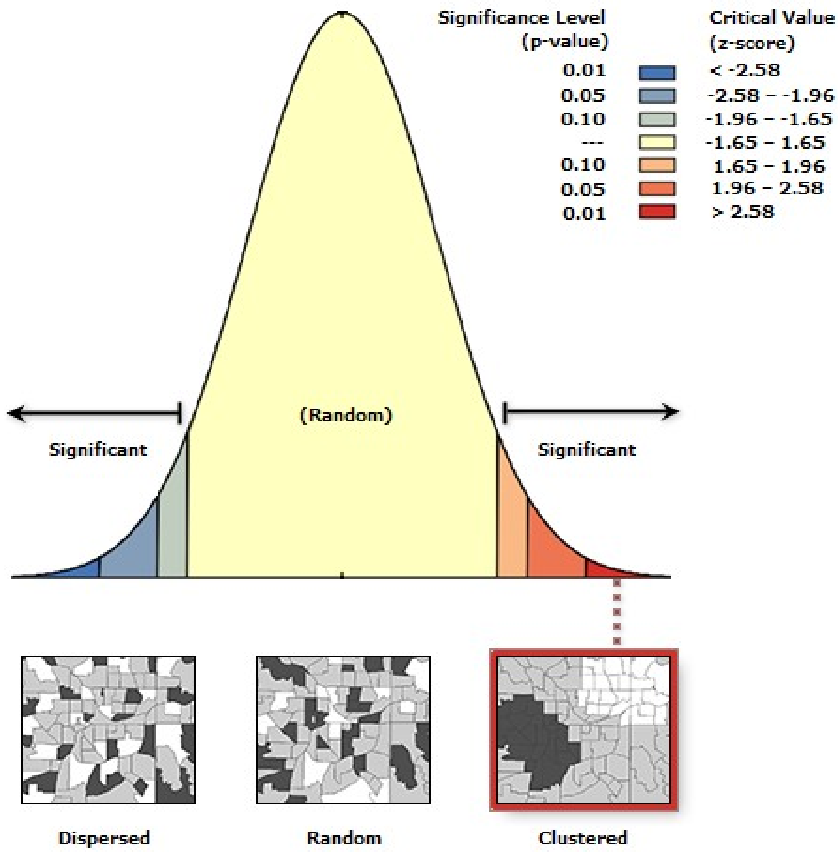

Figure 4.6. Moran's I statistical analysis result between 1961 and 1970.

Source: Researcher's Analysis (2018).

4.2.4. Between 1971 and 1980.

Figure 4.7 indicates the spatial distribution pattern of adoption of cassava in south-eastern Côte d'Ivoire between 1971 and 1980. There is a high concentration in the north-west, central-west and south-east part of the study area. However, in the central part there is no cluster of cassava adopters; instead, a dispersed pattern exists.

As Figure 4.7 shows, pockets of cluster of more than three adopters per village can be found in the northern and north-western part of the study area. Also, a concentration of an average of two adopters per village can be found located in the central part of the region. Villages in the south-east, central and south-west typically have less than two adopters each.

Only 99 villages out of the total (154 villages)number of villages considered had adopted cassava in this year period. More adopters were found in Lacs district than in Lagunes and Comoé. In Comoé district, 24 villages out of 53 villages had adopted cassava. In Lacs district, 47 out of 50 villages adopted cassava between 1971 and 1980. The number of farmers recorded in this district ranged between one and five. Finally, in Lagunes district, 28 villages out of 41 villages had adopted cassava. All the villages had an average of two adopters each.

At the district level, there is a cluster in the central and southern part of Lacs district, while in the northern part of Lacs district a pocket of clustered pattern exists. In the Comoé district, the concentration can be observed in the southern part. Finally, in Lagunes District, there is a dispersed presence of cassava adopters across the district during the period between 1971 and 1980.

In Lacs district there are four villages with an average of 5 adopters per village located in the northen, central-west of the district. At the northern and southern part of the district there are seven villages with an average of 3 to 4 adopters per village, while thirty six villages had an average of 1 to 2 adopters in the Lacs district. In the northern area of district of Comoé, there are seven village with an average of 1 to 2 adopters per village, two villages with an average of 1 to 2 adopters at the central region, while in the southern region of the district there are fifteen villages with an average of 1 to 2 adopters per village. Finally in the district of Lagunes, there are four villages across the district with an average of 3 to 4 adopter, while twenty four villages had an average of

1 to 2 adopters per village spread across the district.

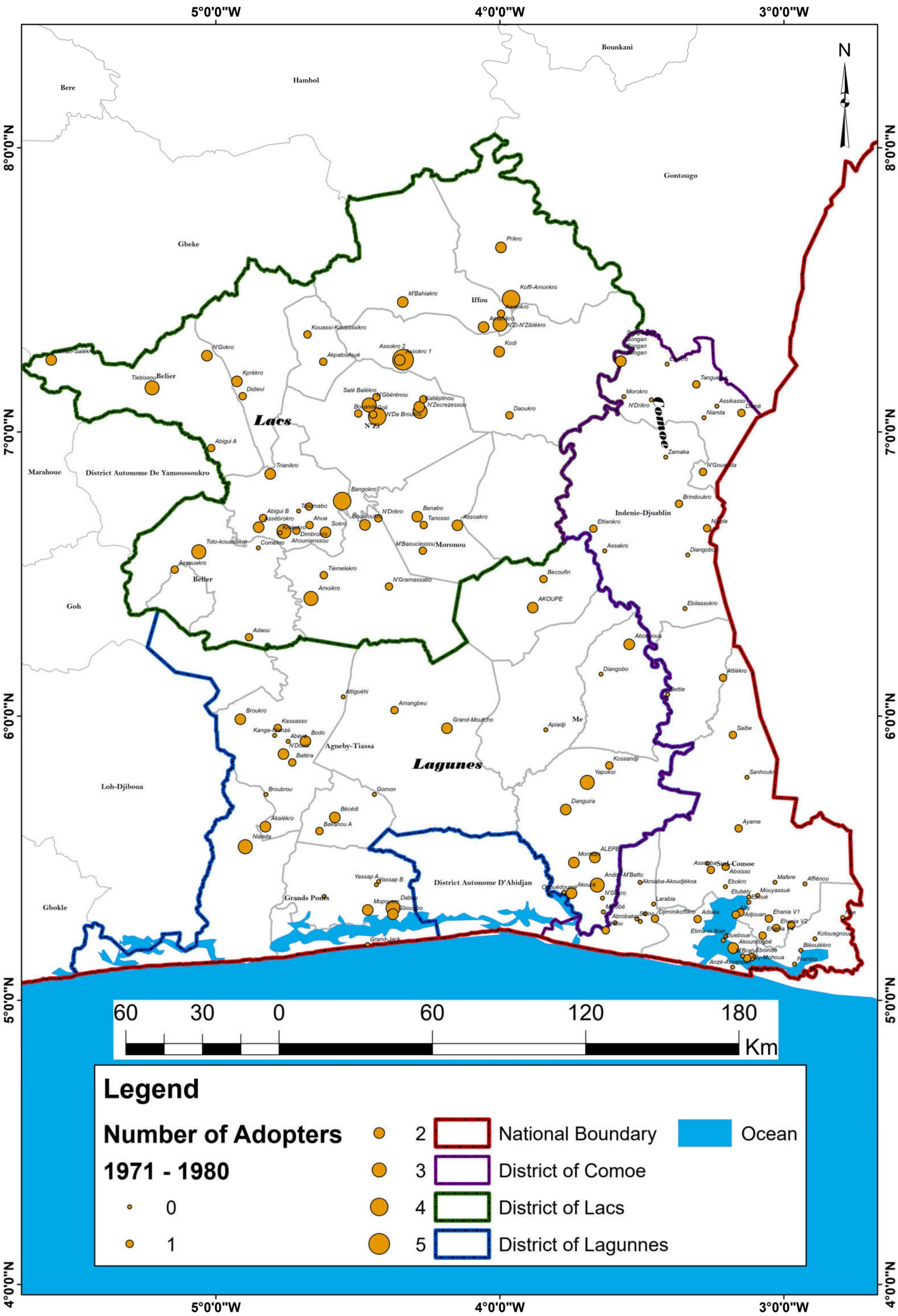

Figure 4.7. Spatial Pattern of Cassava Adoption between 1971 and 1980.

Source: Researcher's Fieldwork (2018).

Hypothesis test result

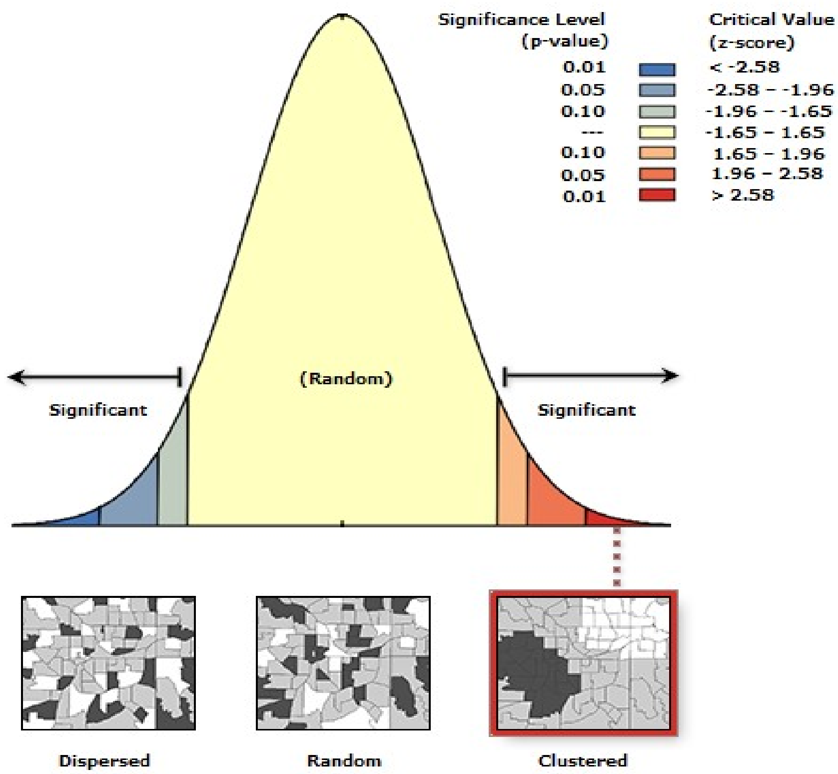

Figure 4.8. Moran's I statistical Analysis Result between 1971 and 1980.

Source: Researcher's Analysis (2018).

Results obtained from descriptive analysis of the Figure 4.7 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.8 indicates the Moran's Index statistics computed for the pattern of adoption between 1971 and 1980. Based on the figure, there is a significant clustering of cassava adoption between 1971 and 1980 as revealed by a I= 0.284831 "p" value of lesser than 0.05 and a Z score range of 1.96 to 2.58. This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa.

The number of adopters for this year seemed to be highly clustered at the southern and of the Comoé district where adopters range between 1 to 2, and also at central Lacs district where the number of adopters ranges between 3 and 4 adopters. Further, it might also be attributed to the fact that since the district of origin is the Comoé district, it is expected that there should be a clustering around the region based on the law of diffusion.

Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is rejected for this year.

4.2.5. Between 1981 and 1990

Figure 4.9 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 1981 and 1990. There is a high concentration in the north-west, central-west and south-east part of the study area. However, in the central part there is no cluster of cassava adopters; instead, a dispersed pattern exists.

As Figure 4.9 shows, pockets of cluster of more than three adopters per village can found in the northern and north-western part of the study area. Also, a concentration of an average of two adopters per village can be foundin the central part of the region. Villages in the south-east, central and south-west typically have less than two adopters each.

Only 109 villages out of the total (154 villages) number of villages considered had adopted cassava between 1981 and 1990. More adopters were found in the Lagunes district than in Lacs and Comoé. In Comoé district, 37 villages out of 53 villages had adopted cassava. In Lacs district, 36 out of 50 villages adopted cassava between 1981 and 1990. The number of farmers recorded in this district ranged between one and five. Finally, in Lagunes district, 36 villages out of 41 villages had adopted cassava.

At the district level, there is a dispersed pattern across the northern and central part of Lacs district, while in the southern part of Lacs district a pocket of cluster exists. In the Comoé district, a concentration can be observed in the southern part of the district. Finally, in Lagunes district, there are pockets of cluster across the district during the period between 1981 and 1990.

In Lacs district there are fifteen villages with an average of 3 to 4 adopters per village located across the district, there are eighteen villages with an average of 1 to 2 adopters per village located across the district, one village with between 5 to 6 adopters exists in the southern area of the Lacs district. In the northern area of district of Comoé, there are four villages with an average of 3 to 4 adopters per village, eight villages with an average of 1 to 2 adopters at the northern region. In the central region of the district of Comoé, there are two villages an average of 1 to 2 adopters per village, and only one village with an average of 3 to 4 adopters, while in the southern region of the district of Comoé, there are eleven villages with an average of 3 to 4 adopters per village, and there are twelve villages with an average of 1 to 2 adopters. Finally in the district of Lagunes, there are seven villages across the district with an average of 5 to 6 adopters per village, there are eleven villages across the district with an average of 3 to 4 adopters per village, there are fifteen villages across the district with an average of 1 to 2 adopters per village, while only one village in the whole district had seven adopters.

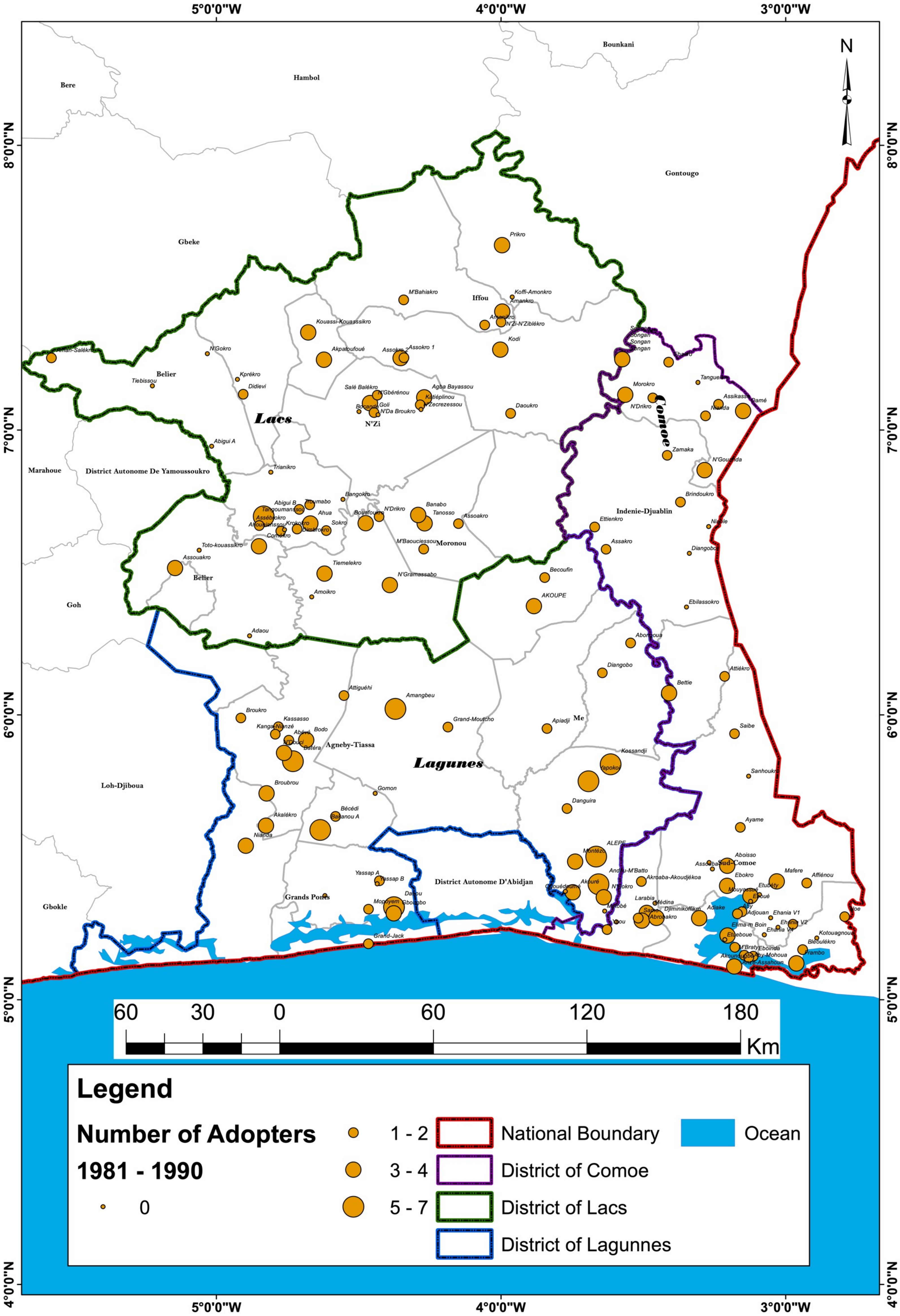

Figure 4.9. Spatial Pattern of Cassava Adoption between 1981 and 1990.

Source: Researcher's Fieldwork (2018).

Hypothesis test result

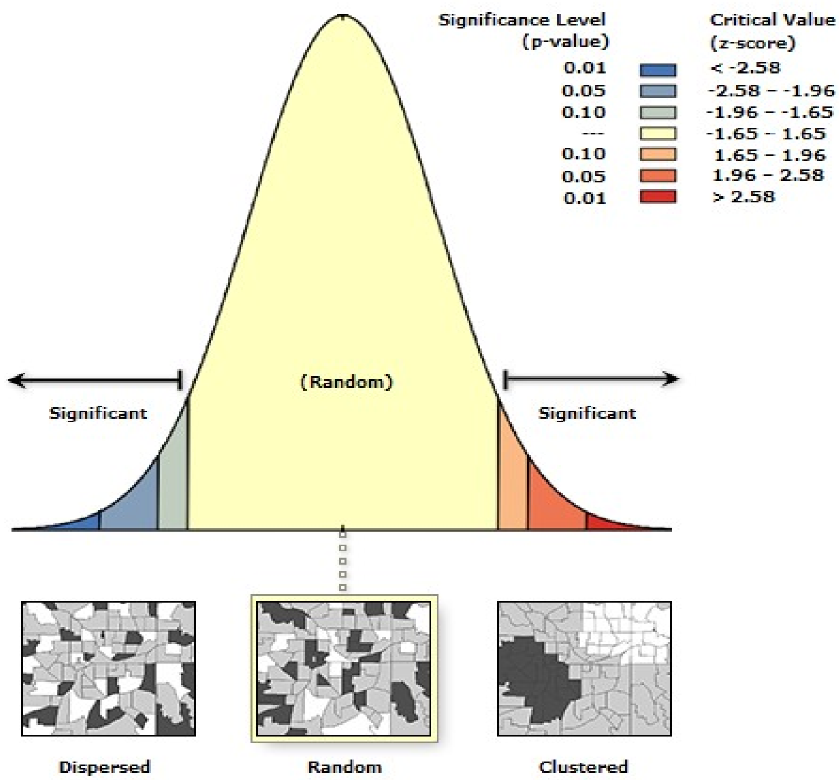

Figure 4.10**. Moran's I Statistical, Analysis Result.**

Source: Researcher's Analysis (2018).

The results obtained from the descriptive analysis of the Figure 4.9 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.10 indicates the Moran's Index statistics computed for the pattern of adoption between 1981 and 1990. Based on the figure, there is a significant clustering of cassava adoption for between 1981 and 1990 as revealed by a I= 0.018274 "p" value of greater r than 0.05 and a Z score between -1.96 to +1.96. This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa.

The number of adopters for this year seem to be highly dispersed at the southern and of the Comoé district where adopters range between 3 to 4, and also at central Lacs district where the number of adopters ranged between 3 and 4 adopters. Further, it might also be attributed to the fact that though the district of origin is the Comoé district, a rapid diffusion of the crop might have influenced the observed pattern. Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is accepted for this year.

4.2.6. Between 1991 and 2000.

Figure 4.11 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 1991and 2000. There is a high concentration in the south and north-west regions of the study area. However, in the central region, there is no cluster of cassava adopters; instead, a dispersed pattern exists.

As Figure 4.11 shows, a concentration of an average of 10 to 13 adopters per village can be found in the south east corner,northern part and west region of the study area. Villages in the central and east regions, typically have an average of 4 to 6 adopters each per village.

Only 139 villages out of the total number of villages considered (154 villages) had adopted cassava in this year period. The number of adopters across each districts is relatively uniform. In Comoé district, 50 villages out of 53 villages had adopted cassava. In Lacs district, 49 out of 50 villages adopted cassava between 1991 and

2000. The number of farmers recorded in this district ranged between one and five. Finally, in Lagunes district, 40 villages out of 41 villages had adopted cassava.

In the Comoé district, only one village had 14 adopters, four villages with an average of 10 to 13 adopters exists, twelve villages with an average of 7 to 9 adopters can be found, there are eighteen villages with an average of 4 to 6 adopters per village and fifteen villages with an average of 1 to 3 adopters per village exists. In the Lac district, eleven villages with an average of 7 to 9 adopters can be found, there are twenty-one villages with an average of 4 to 6 adopters per village. Finally, in Lagunes District, three villages with an average of 10 to 13 adopters per village exists and twelve villages with an average of 7 to 9 adopters per village can be found.

The results obtained from the descriptive analysis of the Figure 4.11 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.12 indicates the Moran's Index statistics computed for the pattern of adoption between 1991 and 2000. Based on the figure, there is a significant clustering of cassava adoption between 1991 and 2000 as revealed by a I= 0.043344 "p" value of greater r than 0.05 and a Z score between -1.96 to +1.96. This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa.

Further, it might also be attributed to the fact that though the district of origin is the Comoé district, a rapid diffusion of the crop due to its benefits might have influenced the observed pattern. Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is accepted for this year.

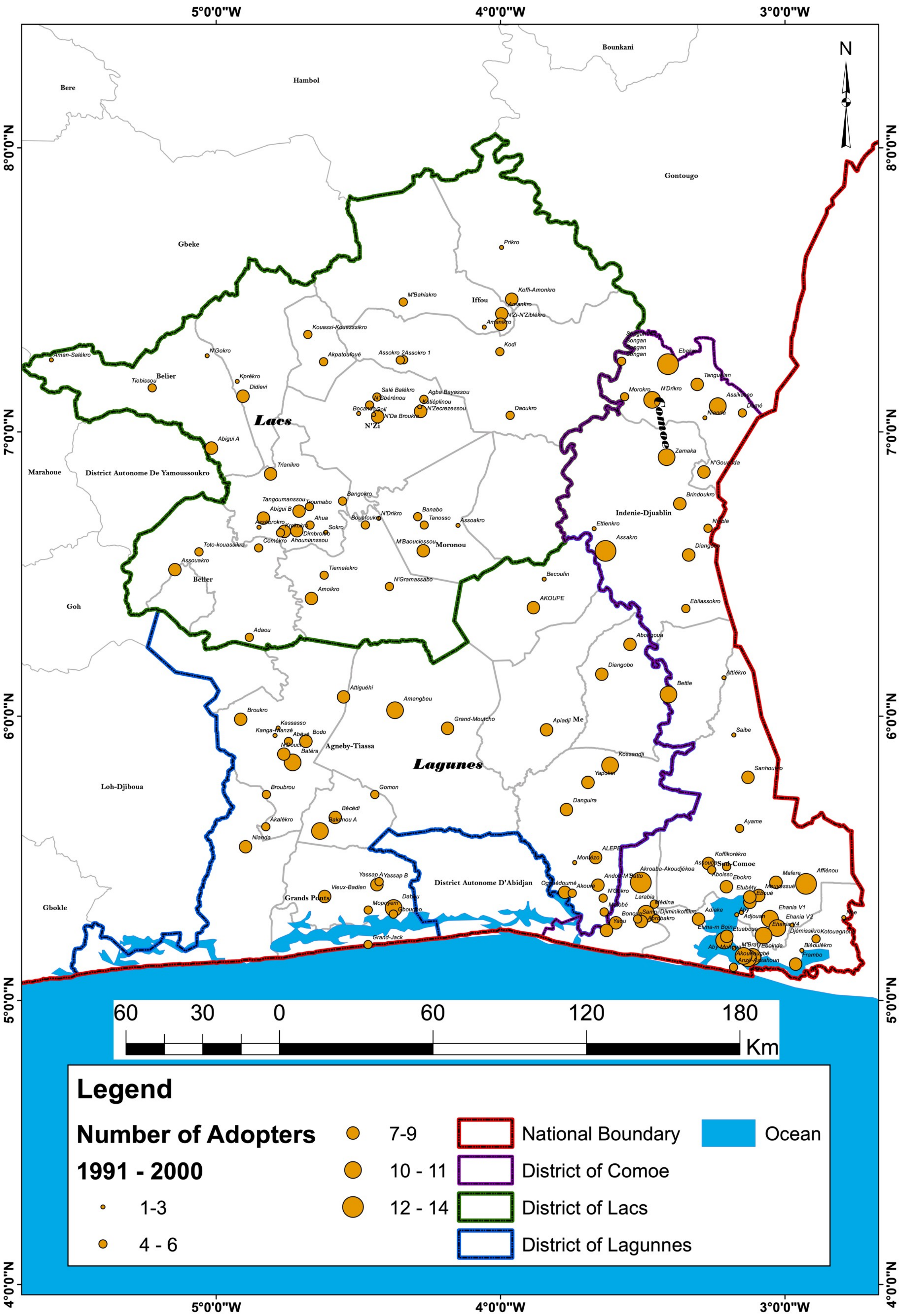

Figure 4.11. Spatial Pattern of Cassava Adoption between 1991 and 2000.

Source: Researcher's Fieldwork (2018)

.

Hypothesis test result

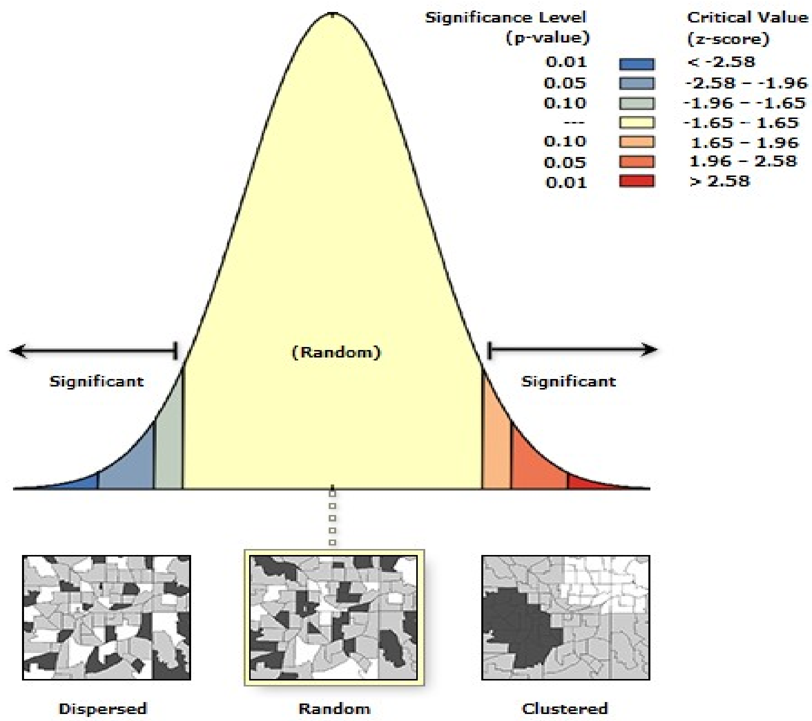

Figure 4.12**. Moran's I Statistical Analysis Result between 1991 and 2000.**

Source: Researcher's Analysis (2018).

4.2.7. Between 2001 and 2010

Figure 4.13 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 2001 and 2010. There is a high concentration in the south-east end of Comoe district, pockets cluster also exists in the central region of Lacs district and in the northwest section of the Lagunes district.

The number of adopters increased considerably with a high concentration in the south-east, center-west, center-north and center-east of the study area with a significant proportion of the number of adopters between 11 -13 as shown in Figure 4.13. As for the other proportions of adopters, they are spread across the whole of the study area with a more or less complete geographical distribution with varied scale over the study area.

All villages had adopted cassava at this period, and an average of 11-13 adopters are most concentrated in the south-eastern and central area. But, there is a spread all over the study area of an average of 5 to 7 adopters per village, while the category of an average of 2 to 4 adopters are not significant across the study area. All the villages considered 154 were villages had adopted cassava in this year period, however more adopters were found in the Comoé and Lacs district than in Lagunes. The number of farmers recorded ranged from 2 to 18 across the study area for this period.

The results obtained from the descriptive analysis of the Figure 4.13 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.14 indicates the Moran's Index statistics computed for the pattern of adoption between 2001 and 2010. Based on the figure, there is a significant clustering of cassava adoption for between 2001 and 2010 as revealed by I= 0.086478, and a "p" value of greater than 0.05 and a Z score +1.96 to 2.58. This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa. Further, it might also be attributed to the fact that though the district of origin is the Comoé district, a rapid diffusion of the crop due to its benefits might have influenced the observed pattern. Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is rejected for this year.

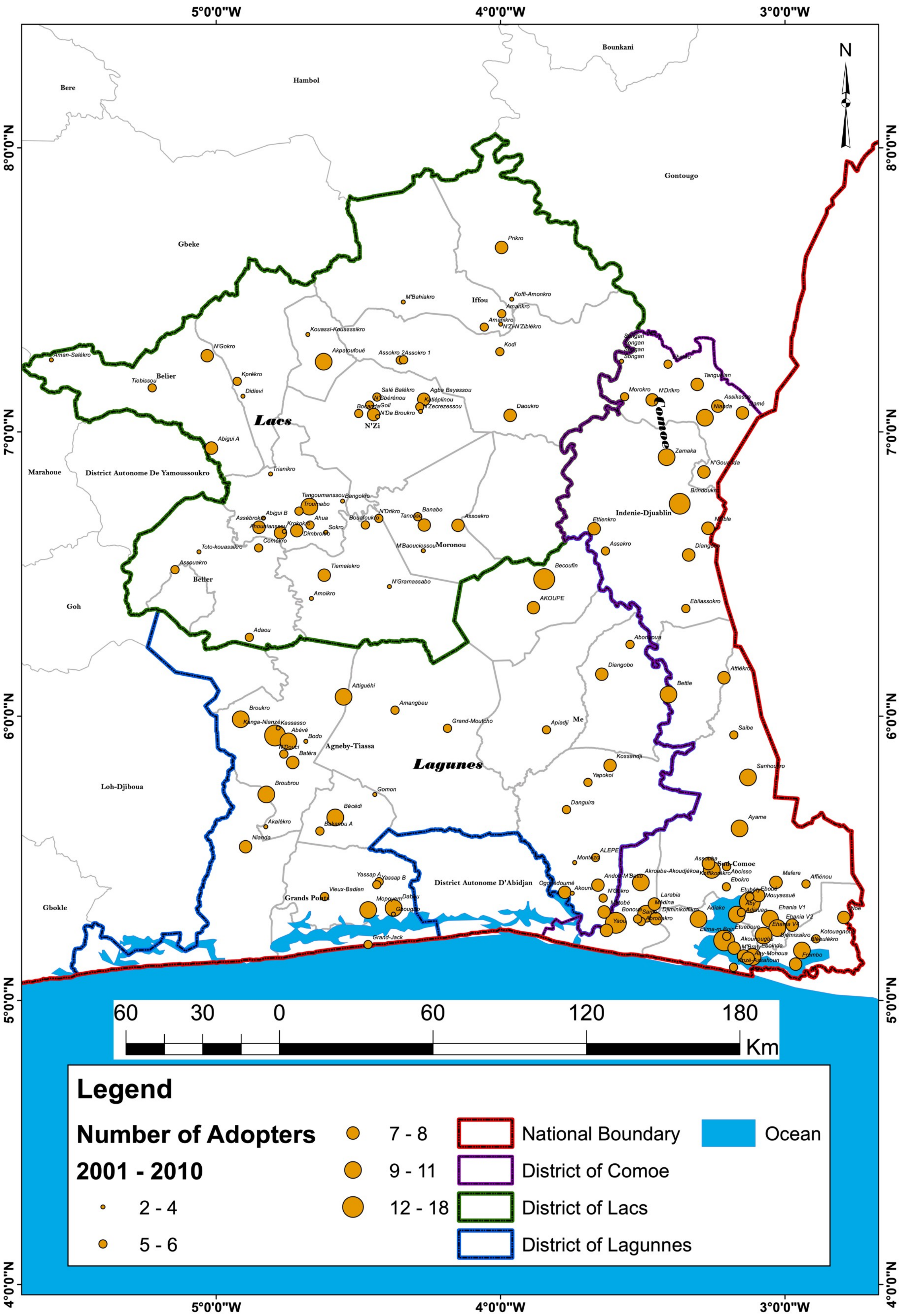

Figure 4.13. Spatial Pattern of Cassava Adoption between 2001 and 2010

Source: Researcher's Fieldwork (2018).

Hypothesis test result

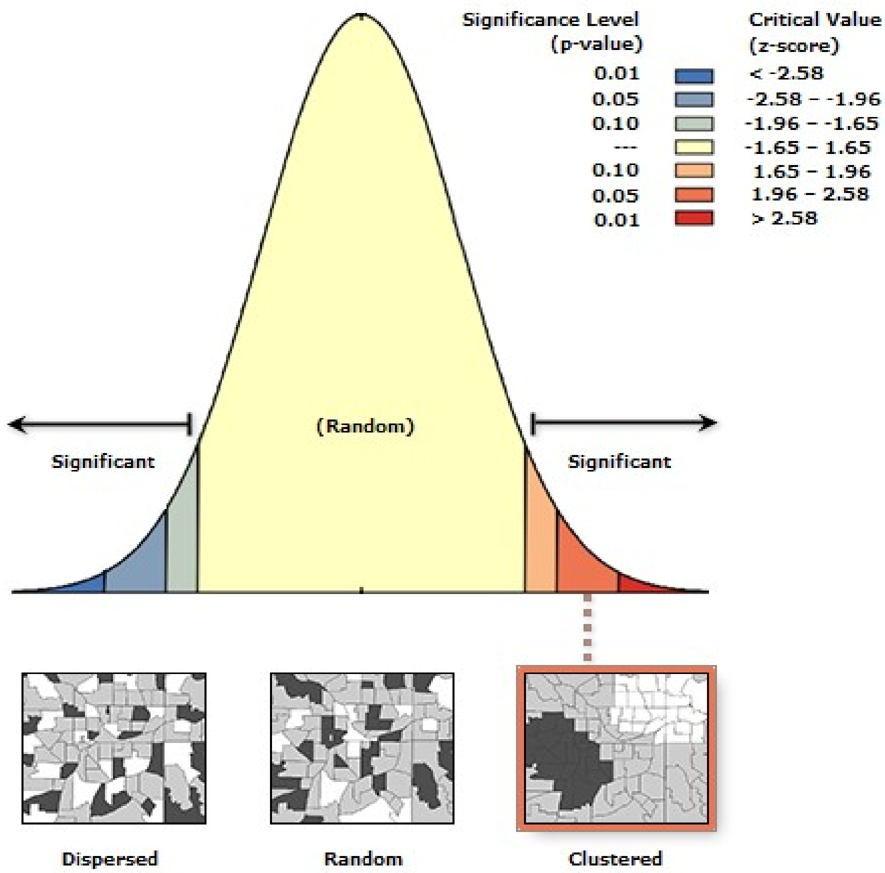

Figure 4.14. Moran's I statistical analysis result between 2001 and 2010

Source: Researcher's Analysis (2018).

4.2.8. Between 2011 and 2017

Figure 4.15 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between 2011 and 2017. There is a high concentration in the south-east end of area in the Comoe district, pockets of cluster also exists in the central region of Lacs district and in the northwest section of the Lagunes district. The number of adopters increases considerably with a high concentration in the south-east, west-central, north-central and east- central of the study area with a significant proportion of the number of adopters 12 -14 as shown in Figure 4.15. As for the other proportions of adopters, they are spread across the whole study area with more or less complete geographical distribution with varied scale over the study area.

All villages in the study area adopted cassava at this period, and an average of 12-14 adopters are most concentrated in the south-eastern and central area. But, there is a spread all over the study area of an average of 12 to 14 adopters per village. All the villages considered (154 villages) had adopted cassava in this year period, however more adopters were found in the Comoé and Lacs district than in Lagunes. The number of farmers recorded ranged from 2 to 18 across the study area for this period. In the Comoé district, eight villages with an average of 15 to 18 adopters can be found, six villages with an average of 12 to 14 adopters can be found, there are ten villages with an average of 10 to 11 adopters per village. In the Lac district, three villages with an average of 15 to 18 adopters can be found, there are ten villages with an average of 12 to 14 adopters per village. Finally, in Lagunes district, four villages with an average of 15 to 18 adopters per village exists, eleven villages with an average of 12 to 14 adopters per village can be found.

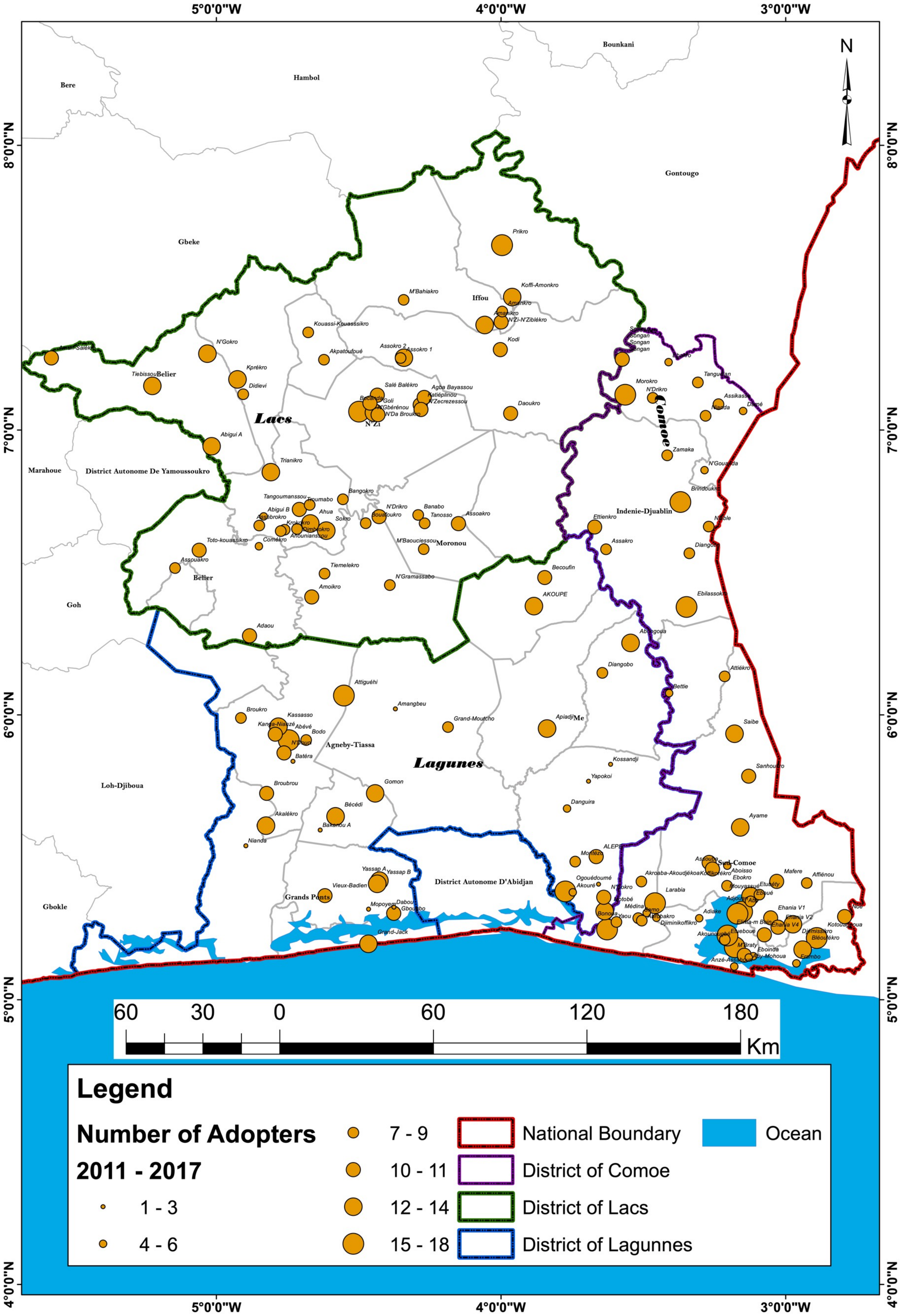

Figure 4.15. Spatial Pattern of Cassava Adoption between 2011and 2017

Source: Researcher's Fieldwork (2018).

Hypothesis test result

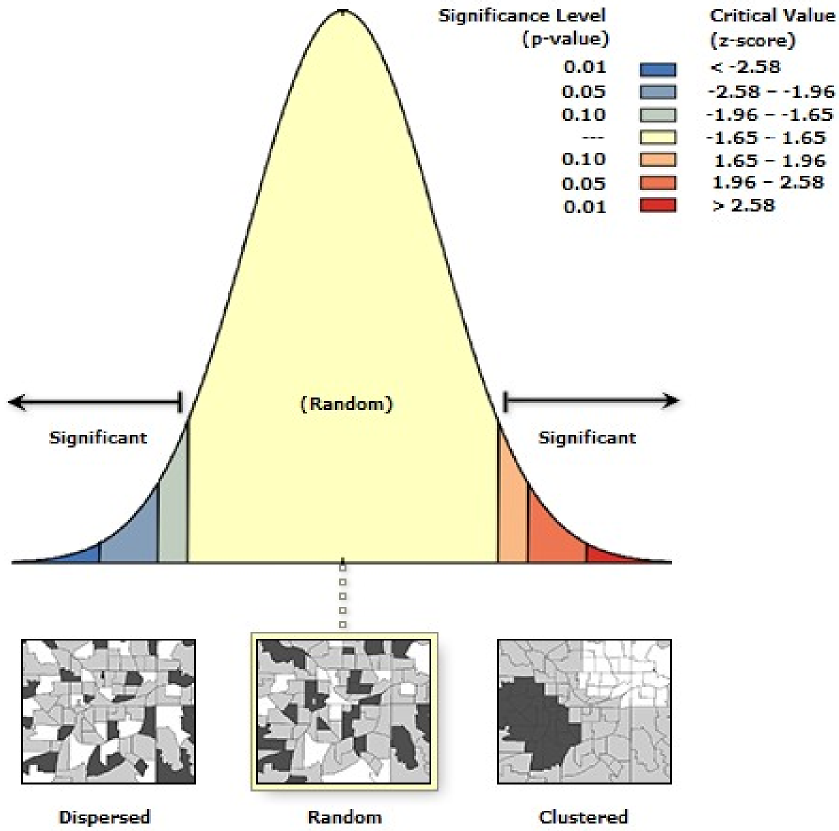

Figure 4.16**. Moran's I Statistical Analysis Result between 2011 and 2017.**

Source: Researcher's Analysis (2018).

The results obtained from descriptive analysis, Figure 4.15 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.16 indicates the Moran's Index statistics computed for the pattern of adoption between 2001 and 2010. Based on the figure, there is a significant clustering of cassava adoption for between 2001 and 2010 as revealed by I= 0.017179, and a "p" value of greater than 0.05 and a Z score +1.96 to -1.96. This was made possible at a probability level of 0.01 and confidence interval of 99%, indicating the degree of significance such that the higher the significance level (p-value), the lower the confidence interval and vice-versa.

Further, it might also be attributed to the fact that though the district of origin is the Comoé district, a rapid diffusion of the crop due to its benefits might have influenced the observed pattern, as well as technological advancement in the agricultural sector. Therefore, the hypothesis, which states that the spatial pattern of cassava adoption is random, is accepted for this year.

4.2.9. In 2017 (before 1950- 2017)

Figure 4.17 indicates the spatial pattern of adoption of cassava in south-eastern Côte d'Ivoire between pre-1951 and 2017. Figure 4.17 indicates that the level of cassava adopters is random. From the result of the analysis, a dispersed pattern can be seen across the sudy area as no significant clustering can be seen any where on the map. All the villages considered for this study, recorded a significant amount of adopters over the years i.e between 1951 to 2017. The number of adopters can be seen to increase gradually across the study area from an average of 1 to 10 adopters per village to an average of 31 to 40 adopters per village for this time period.

In the Comoé district, three villages with an average of 31 to 40 adopters can be found, forty villages with an average of 21 to 30 adopters can be found. In the Lac district, there are two villages with an average of 31 to 40 adopters per village, thirty-nine villages with an average of 21 to 30 adopters per village can be found. Finally, in Lagunes district, there are five villages with an average of 31 to 40 adopters per village, while thirty-two villages with an average of 21 to 30 adopters per village can be found.

The results obtained from the descriptive analysis of the Figure 4.17 were used as data for the inferential analysis in order to invalidate or validate the hypothesis that states the adoption of cassava is random through Global Moran's I.

Figure 4.18 shows the Moran's Index statistics computed for the period of Pre-1951 to 2017. The result revealed that the overall spatial pattern of cassava adoption for the selected years is random. This is further ascertained in the Moran's Index result shown above in the generated chart as revealed by a I=0.050589 "p" value of 0 and a Z score range of +1.96 to -1.96. Furthermore, the random distribution of the adoption is also depicted in the map shown in Fig. 4.18.Therefore, on an overall scale, the hypothesis which states that the spatial pattern of cassava adoption is random is hereby accepted for the total number of years considered for this study.

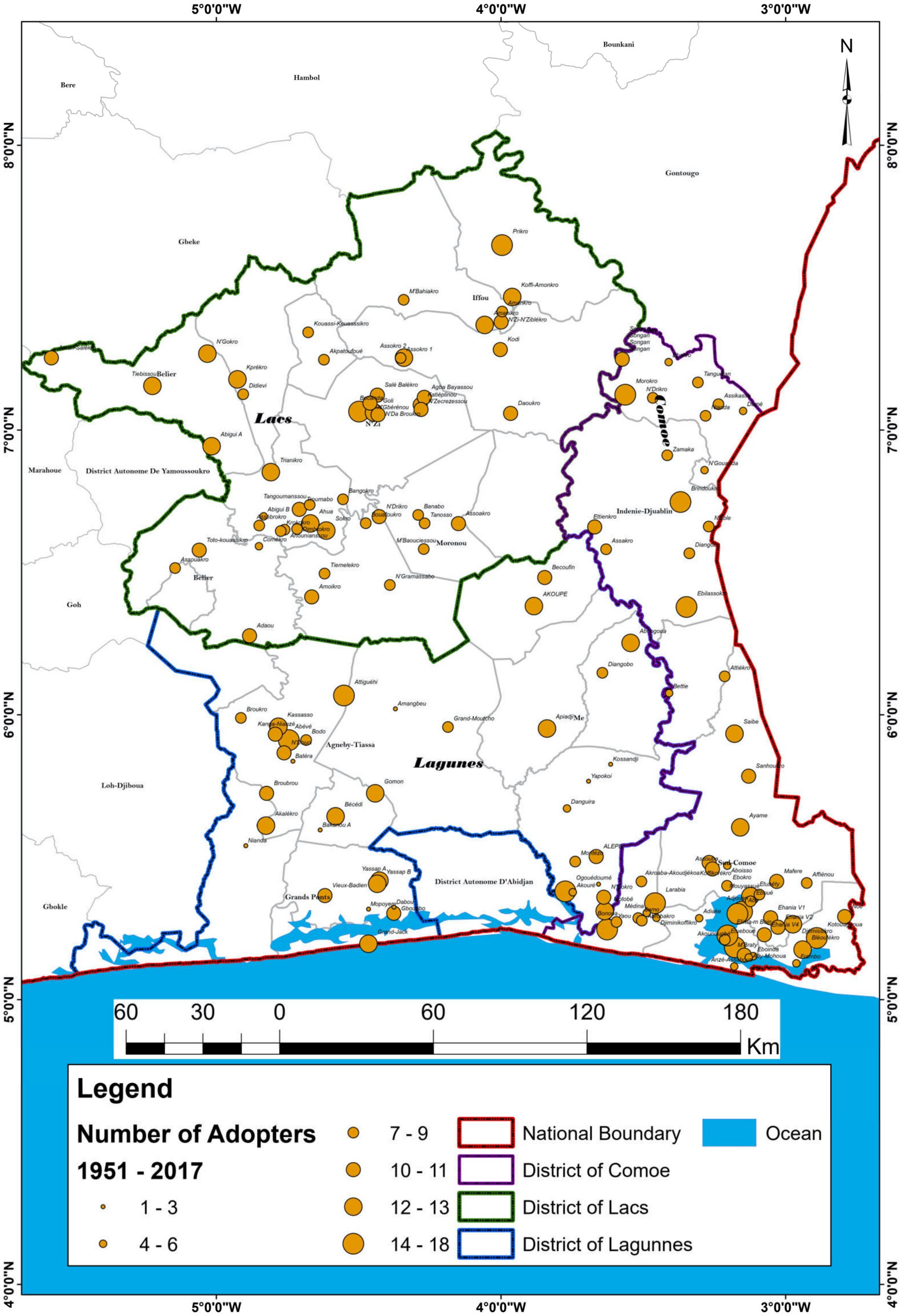

Figure 4.17**. Current Spatial Pattern (before 1950 to 2017) of Cassava Adoption.**

Source: Researcher's Fieldwork (2018).

Hypothesis test result

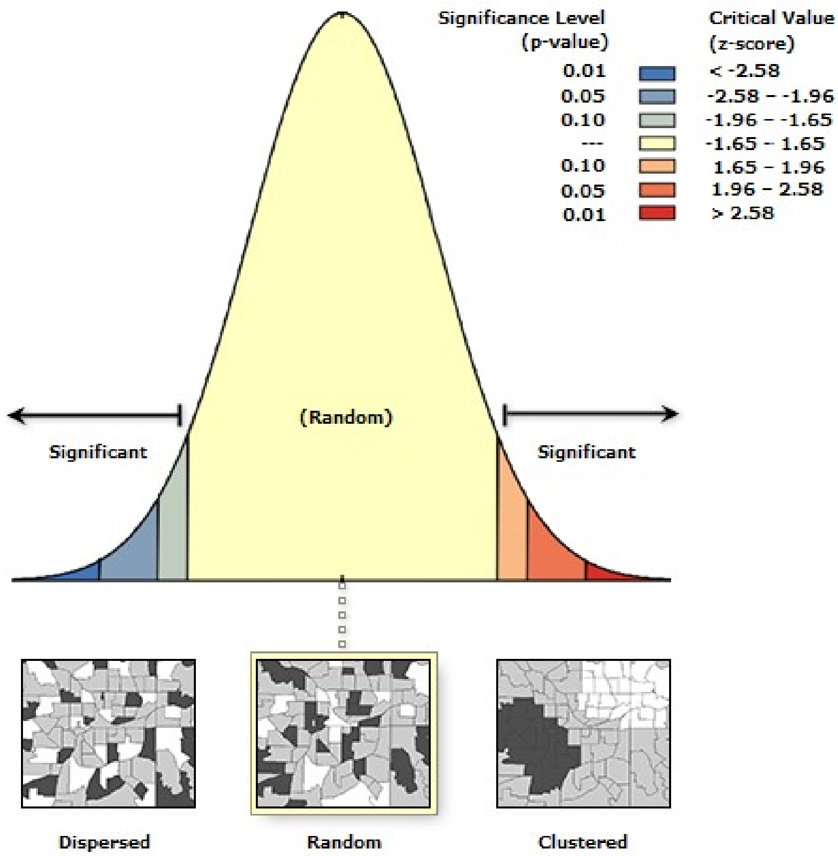

Figure 4.18. Moran's I Statistical Analysis Result before 1951 and 2017.

Source: Researcher's Analysis (2018).

The analysis conducted above for all the years considered in this study to ascertain the spatial pattern of cassava adoption in the study area based on the year of adoption as reported by the respondent during the questionnaire survey revealed a clustered pattern for four set of years, and a random pattern for the others. From the above, it was observed that the following classes of years ascertained a randon spatial pattern for cassava adoption, these years are 2011 – 2017, 1991 – 2000, 1981 – 1990, and pre-1950. The remaining classes of years revealed a clustered spatial pattern and these years are; 2001 – 2010, 1971 – 1980, 1961 – 1970, and 1951 – 1960. Furthermore, the same analysis was conducted for the year in concert, in other words from 1951 – 2017, and it was discovered that on a longer and lengthier scale, the overall spatial pattern that was observed random. This observation may be attributed to the dichotomy that might have occurred in the pattern recorded for the individual class of years. Hence, the hypothesis was treated based on the individual class of years considered in this study as well as the whole length of years considered in the study.

The adoption of diffusion of an innovation, as Rogers (1962, 1995 and 2003), Cliff (1968), Frasson (1996) take into account an important element, which is the notion of time.

Thus, as previously demonstrated at the spatial level, based on the tools allowing this diffusion as stated in the literature review, the researcher see how this adoption is percived by the adopters over time.

4.3. Temporal pattern of adoption of cassava

The number of adopters over the years, that is pre-1951–2017 was analysed. Figure 4.19 shows that the number of adopters varies considerably according to the years. Before 1951, the number of adopters was 53 persons. However, from 1981 to 1990 the number of adopters increased considerably to 300. From 1991, the number of adopters continued to grow until it reached a threshold of 1,422 adopters after 2011. The percentage of adopters varies considerably by year. Indeed, from 1.3% before 1951 to 35.6% after 2011 (2011to 2017) in the southeast of Côte d'Ivoire.

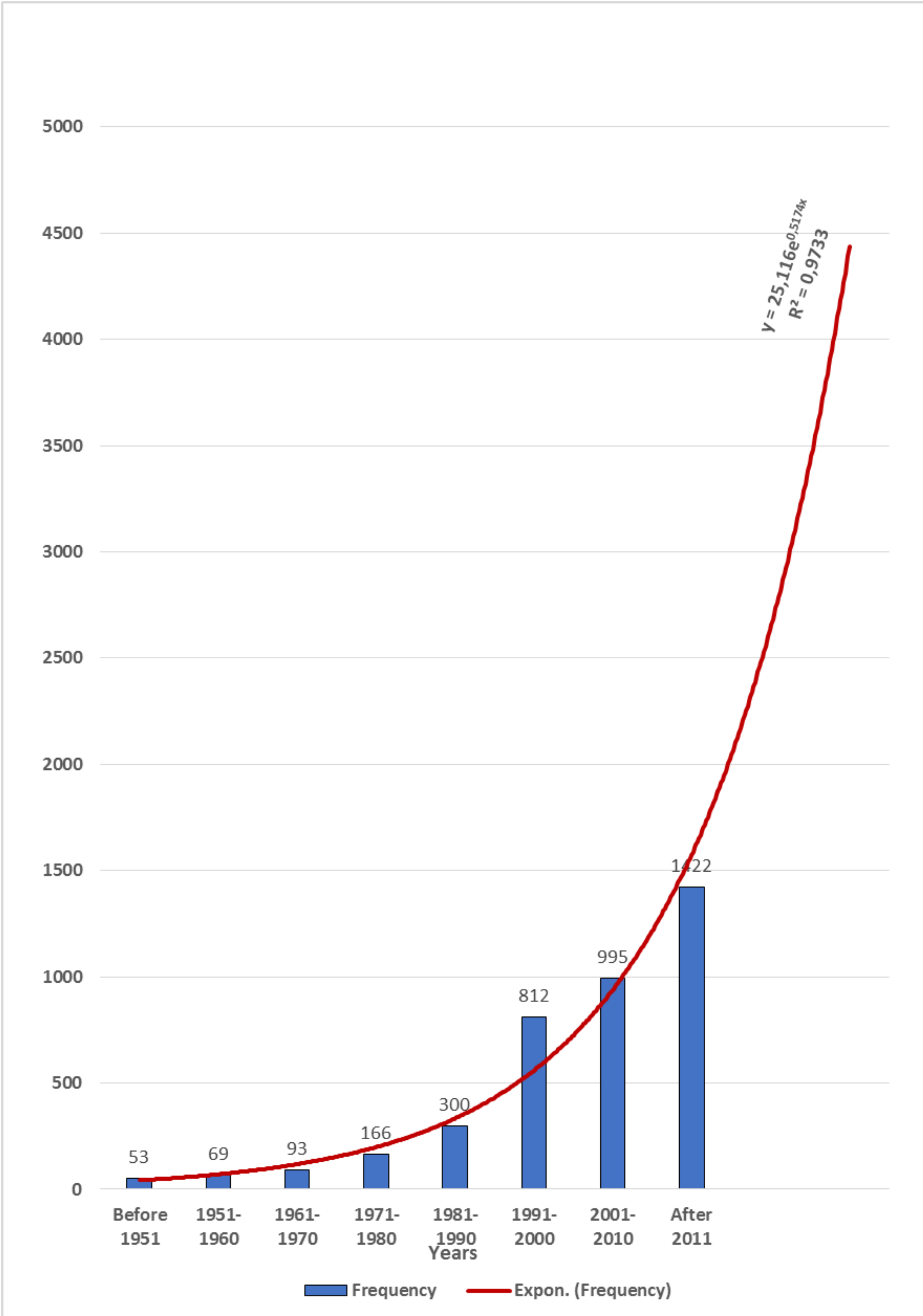

Figure 4.19**. Overall Trendline of Cassava Adoption.**

Source: Researcher's Analysis (2018).

The exponential trend curve, Figure 4.19 indicates that there is an upward trend of cassava adoption. In other words, there is an increase in the number of cassava adopters, this increase is expected to be continuous until it achieves the peak and then evens out like Rogers (2003) explains. At every year following after 1951 there seems to be an increase rate between 10% to about 150% in the number of adopters for the different years respectively.

The number of cassava adopters increased and categorised into two stages. The first step is before 1951 to 1990. The number of adopters is slowly changing. The second step starting in 1991, there is remarkable growth in the number of adopters until after 2011. In fact, the number goes from 812 to 1,422 adopters of cassava (Table 4.1). For example, the number of adopters before 1951 was 53 which increased to 69 adopters between 1951 and 1960 this give us a difference in number of adopters as 16 adopters resulting in an increase rate of 25.4% and this rate continuous to rise exponentially till it reaches an increase rate of 96.3% after 2011.

Further, the number of adopters over the years is presented in the Table (4.1) with the years from before 1951 to after 2011 (2017). Before 1951, there are 53 adopters and these accounted for 1.3% of the total of adopters recorded over the years.

The number of adopters between the years 1951 and 1960 accounted for 1.7% (69 respondents) of the total count of respondents. The respondents who stated that they started cultivating cassava as a crop between 1961 and 1970 accounted for 2.3% (93 respondents). The portion of the respondents who adopted cassava between 1971 and 1980 accounted for 4.2% (166 respondents).

Furthermore, 7.5% (300 respondents) adopted cassava between 1981 and 1990, and respondents who adopted cassava between 1991 and 2000 accounted for 20.3% (812 respondents). The number of respondents who adopted cassava between 2001 and 2010 accounted for 24.9% (995 respondents), while those that adopted cassava after 2011 accounted for 35.6% (1,422 respondents). This increase in the number of cassava adopters in southeastern Côte d'Ivoire rose considerably over time with the value $R^2 = 0.72$

Buttressing the above, an increasing trend is revealed in the proportion of each year interval as used in the study (Figure 4.19).

To test the hypothesis that the number of people adopting cassava varies significantly over the years, the One-way Analysis of Variance statistical test was used to confirm the variation in the number of adopters over the years in the south-eastern Côte d'Ivoire (Table 4.1).

It was discovered that a significance variation exists in the number of adopters of cassava over the years specifically before 1951 and 2017. The significance variation was observed at 95% confidence interval and a 0.05 probability level.

The result of the One-way analysis of variance test (Table 4.1) gave a significance value less than the probability level (F= 6.224, Sig. = 0.000) denoting that there is a significant variation in the number of adopters among the selected years of the study. However, the number of cassava adopters vary sigificantly also among the districts?

Table 4.1. Variation in Number of adopters among the Years of Study

Number of Adopters					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	203.787	7	29.112	6.224	.000
Within Groups	18251.585	3902	4.677		
Total	18455.372	3909			

Source: Researcher's Analysis (2018).

The results obtained in general on the number of cassava adopters in the south-east of Côte d'Ivoire served as a basis for comparing adoption at the level of each district. Thus, we note in the Comoé district, the number of cassava adopters in Comoé district. Before 1951 accounted for 0.6% (24 respondents) of the total of adopters.The number of adopters between the year 1951 and 1960 accounted for 0.2% (8 respondents) of the total count of respondents in this district. The respondents who said they started cultivating cassava between 1961 and 1970 accounted for 0.2% (7 respondents). The portion of the respondents who adopted cassava between 1971 and 1980 accounted for 0.6% (22 respondents). Furthermore, 2.2% (87 respondents) represents those who adopted cassava between 1981 and 1990, respondents who adopted cassava between 1991 and 2000 accounted for 8.2% (319 respondents). The number of respondents who adopted cassava between 2001 and 2010 as a crop they cultivated accounted for 10.6% (413 respondents), while those that adopted cassava after 2011 accounted for 13.0% (508 respondents). The continuous increasing curve shows a growing trend in the number of adopters by years. It results in the value of the curve $R^2 = 0.65$. All the total foregoing proportions account for 100% (1,388 respondents) proportion of the total count of respondents across the study area (Appendix IV). For District of Lagunes, the number of adopters before 1951 accounted for 0.1% (4 respondents) of the total of adopters recorded in Lagunes. The number of adopters between years 1951 and 1960 accounted for 0.2% (9 respondents) of the total of respondents in this district.The respondents who stated that they started cultivating cassava as a crop between 1961 and 1970 accounted for 0.8% (30 respondents). The portion of the respondents who adopted cassava between 1971 to 1980 accounted for 1.4% (30 respondents). Furthermore, 3.3% (128 respondents) represents those who adopted cassava between 1981 and 1990, respondents who adopted cassava between 1991 and 2000 accounted for 7.0 % (275 respondents). The number of respondents who adopted cassava between 2001 and 2010 as a crop they now cultivated accounted for 8.09% (312 respondents), while those that adopted cassava after 2011 accounted for 10.5% (411 respondents). The observation also shows that the number of adopters of cassava in the Lagunes district is considerably higher in three major stages. Indeed, there is a very small proportion of the number of adopters of cassava from 1951 to 1970. From 1971 to 1990, there was a slight increase in the number of adopters reaching 128. Finally, from

1991 to after 2011, the number of adopters has increased significantly to 411. The number of adopters in the Lagunes is constantly changing according to the years (before 1951 to after 2011) shows that the number of adopters of cassava cultivation is constantly changing. It results in the linear curve which is changing with $R^2 = 0.77$. All the foregoing proportions account for 31.2% (1224 respondents) proportion of the total of respondents across the study area (Appendix IV). Finally, for District of Lacs, there are two major phases in the adoption of cassava. The first phase is from 1951 to 1990. During this period, the adoption is almost constant with 89 adopters. The second phase is from 1991 to after 2011. During this period, the adoption of cassava increased. In fact, the number has increased from 218 to 503 adopters as shown in (Appendix IV). In addition, over the period indicated (before 1951 to after 2011), there is a considerable change in the number of adopters in the Lacs district. This is visible by the linear curve $R^2 = 0.69$. The number of adopters before 1951 accounted for 0.6% (25 respondents) of the total of adopters. The number of adopters between1951 and 1960 accounted for 1.3% (52 respondents) of the total respondents in this district. The respondents who stated that they started cultivating cassava between 1961 and 1970 accounted for 1.4 % (56 respondents). The portion of the respondents who adopted cassava between 1971 and 1980 accounted for 2.3% (89 respondents). Furthermore, 2.2% (85 respondents) represents those who adopted cassava between 1981 and 1990, respondents who adopted cassava between 1991and 2000 accounted for 5.6% (218 respondents).The number of respondents who adopted cassava between 2001 and 2010 as a crop they now cultivated accounted for 6.9% (270 respondents), while those that adopted cassava after 2011 accounted for 12.9% (503 respondents). All the foregoing proportions together account for 33.2% (1298 respondents) proportion of the total respondents across the study area. The importance of this study is that the following authors, Rogers 2003, Fagbemissi C Coulibalyo, Hanna R, and Endamana D, 2002, Agwu, A.and Anyaeche, C. 2007, Obinne, C.1991 have partially demonstrated the temporal adoption of cassava and have mostly limited themselves to the adopters. This study furthermore highlights the temporal adoption of cassava at the village level to also follow the temporal evolution of villages in the adoption of cassava in the south-eastern part of Côte d'Ivoire.

4.3.1. Cassava adoption across villages

Figure 4.20 shows the number of cassava adopters in the villages. In fact, the observation of the figure highlights three great situations in the adoption of cassava in the villages surveyed according to the years.

The first phase is from the period before 1951 to 1970. In this phase, the number of adopters of cassava is almost total with the number of high adopters who are 91 adopters. the second phase is between 1971 and 1990. Indeed, at this stage, there is a slight increase in the number of adopters from 162 to 300 adopters. Finally, the last phase is the period between 1991 and after 2011. In this period, the number of adopters increased significantly. Indeed, the number goes from 805 to more than 1,400 adopters. This increase in the number of adopters as a function of time allows us to establish the analysis curve. This linear curve is increasing with the value of $R^2 = 0.72$ as shown in Figure 4.20.

More significantly, the number of adopters across the villages before 1951 accounted for 1.37% (53 respondents) of the total of adopters recorded in Lakes district over the years.The number of adopters between 1951 and 1960 accounted for 1.75% (68 correspondents) of the total respondents in this district.

The respondents who stated that they started cultivating cassava as a crop between 1961 and 1970 accounted for 2.34% (91 respondents). The portion of the respondents who adopted cassava between 1971 and 1980 accounted for 4.17% (162 respondents). Furthermore, 7.73% (300 respondents) represents those who adopted cassava between 1981 and 1990, respondents who adopted cassava between 1991 and 2000 accounted for 20.74% (805 respondents).The number of respondents who adopted cassava between 2001 and 2010 as a crop they now cultivated accounted for 25.55% (992 respondents), while those that adopted cassava after 2011 accounted for 36.35% (1,425 respondents).

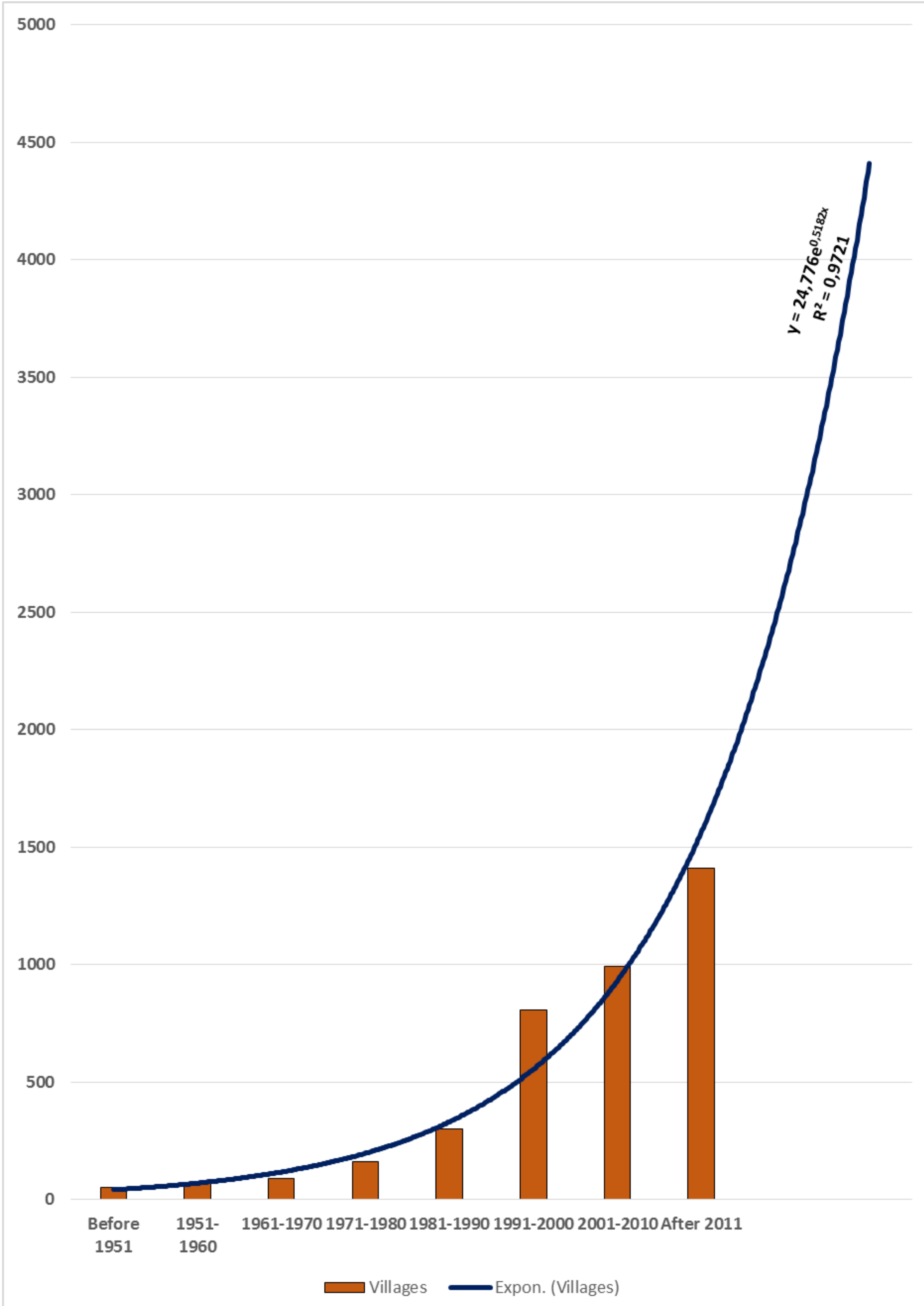

Figure 4.20 Trend of Cassava Adoption across Villages

Source: Researcher's Analysis (2018).

The number of adopters vary significantly among the years. This variation in the number of adopters recorded over the years is perceptible at the general level, then at the level of each district and finally, at the level of the villages.

The trend analysis test revealed that there were rising trend expected because of the sampling error and it is expected to continue till it attains the peak and then normalizes. Furthermore, the same trend analysis were carried out at district level across the three districts of study within the study area (South-eastern Côte d'Ivoire). The same conclusion recorded for the trend analysis conducted for the years were also recorded for the three districts, thus the trend of cassava adoption is expected to rise across the three districts. In other words, the number of adopters is expected to be on the rise and in the nearest future achieves a peak and then normalize.

At the end, the result obseverd follow the principles stage of the theory of adoption of innovation of Rogers (1995 and 2003) and also the work of Bamire, A., Fabiyi, L. and Manyong (2002), Kavia et al, (2007), Muhire et al, (2014), Diaconoa et al, (2012). In the writings if these authors, time variable is the most significant inasmuch as it makes it possible to invalidate or validate adoption. But, what we must remember over time is that population are increasingly tempted to embrace innovation because it offers considerable advantages that can have a positive impact on people's lives in society. And it is this economic basis that allows us to approach our analysis of the real reasons for the adoption of cassava in southeastern Côte d'Ivoire as follows.

4.4. Variation of adoption among socio-economic groups

Table 4.2 indicates the variation of the reasons for the adoption of cassava among age groups. The main reason for adopting cassava is the financial reason. This reason accounts for 43.3% and it was done by the age group between (41 and 50) which is 395 people out of the total of 1,729 respondents. It was further noted that the age group which accounted for the largest portion of the total 3,992 respondents said that they adopted cassava solely for financial reason. The second reason for cassava adoption is because of financial and for feeding. Indeed, this group account for 29.7% of the total 3,992 respondents that gave their reasons for cassava adoption and cultivation. The majority age group is between (31 and 40) with 350 on the total of 1,187 respondents.

For the following reasons, 15.0% of the total number of respondents with the majorty age groups (31 and 40 years) stated that they adopted cassava to feed their family. Only 9.9 % with the age groups (41 and 50) adopted cassava because it is usually being cultivated by their ethinic group. 0.8% with the majority age groups (51 and 60) adopted cassava as a crop because they got encouragement from the government. Finally, 0.6% adopted cassava due to ease of cultivation, while 0.7% adopted cassava because of its high demand in the market.

Generally, it was discovered that the interest of respondents in cassava cultivation is geared more towards financial benefits and this is obvious among the farmers between 31 to 60 years old as shown in Table 4.2. The possible reason for this is that in the rural area most of the farmers within this age bracket were born in the study area and already understood the basics and rudiments of the crop hence the farmers have lot of experience in cassava cultivation and consequently the children are also incorporated into the development of farms.

Table 4.2. Reasons for Cassava Adoption among Age Groups

Reasons for adoption		Age groups						Aggregate
		<21	21 – 30	31 – 40	41 - 50	51 - 60	>60	
Financial Reasons	Number	173	268	371	395	337	185	1729
	Percentage	77.9%	44.8%	36.2%	41.2%	44.4%	42.9%	43.3%
To feed my family Consumption	Number	42	66	179	106	109	96	598
	Percentage	18.9%	11.03%	17.5%	11.05%	14.4%	22.3%	15.0%
Usual crop cultivated by my Ethnic group	Number	0	22	98	185	81	8	394
	Percentage	0.0%	3.7%	9.6%	19.3%	10.7%	1.8%	9.9%
Encouragementfrom Government	Number	0	0	11	0	15	7	33
	Percentage	0.0%	0.0%	1.08%	0.0%	1.9%	1.6%	0.8%
Easy to Cultivate	Number	0	0	15	9	0	0	24
	Percentage	0.0%	0.0%	1.5%	0.9%	0.0%	0.0%	0.6%
Financial Reason and to feed	Number	7	226	350	264	216	124	1187
	Percentage	3.15%	37.8%	34.1%	27.5%	28.5%	28.8%	29.7%
In Demand in Market	Number	0	16	0	0	0	11	27
	Percentage	0.0%	2.7%	0.0%	0.0%	0.0%	2.5%	0.7%
Total	Number	222	598	1024	959	758	431	3992
	Percentage	100%	100%	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Two main reasons determine the adoption of cassava. Financial and food consumption. The adoption of cassava procures satisfaction due to the income and they can also use cassava for different type of dishes in the study area. Finally, age is very important in the adoption of cassava indeed, it determines the size of the work force in the whole south-eastern Côte d'Ivoire.

The nature of the variation among the reasons of adoption of cassava among age of respondents was tested using Pearson's chi-square test of relationship (Table 4.8). The reasons were cross-tabulated with the age of respondents in order to ascertain the significance of the variation. At a set significance level of 0.05, a confidence interval of 95%, the chi-square test revealed that there is a significant variation (Chi Square= 483.061, Sig. =.000). Hence, it can be deduced that the adoption of cassava varies significanlty among the age groups.

The descriptive analysis (Table 4.3) revealed the variation between the reasons of adoption of cassava and sex groups of the respondents. Based on the table, there are1,836 male respondents and 2,130 female respondents. Further, it was also observed that the main reason behind the choice of farmers to adopt cassava is mainly for financial benefits. Based on the total respondents (4,000 farmers), only 3966 stated their gender and this number formed the basis of analysis for this section. A total of 846 male respondents and 873 female respondents both accounting for 43.3% of the total respondents, stated that they cultivate cassava for financial reasons. The second reason for adopting cassava is also financial reason and to feed. Indeed, 1195 (543 male and 652 female) adopting cassava for this reason. These both accounted for 30.1% of the total of respondents. The others reasons are to feed their family. For this reason, we have 246 male respondents and 328 female respondents. Both accounted for 14.5% of the total respondents. While, 172 male respondents and 222 female respondents stated they adopted cassava because it is usually cultivated by their ethnic group, these accounted for 9.9% of the total respondents. Eleven male respondents and 22 female respondents stated that they adopted cassava because they were encouraged by the government, these accounted for 0.8% of the total respondents. While 8 male respondents and 16 female respondents stated that they adopted cassava due to ease of cultivation, and these accounted for 0.6% of the total respondents. Finally, 10 male respondents and 17 female respondents stated that they adopted cassava due to the demand in the market both accounted for 0.7% of the total respondents. Furthermore, cassava is becoming a crop associated with women because it is easier to produce and process according to the respondents. In addition, getting a small piece of land to cultivate cassava is also easy as opposed to the cultivation of cassava for export because men are mostly involved in this. Cassava production helps them support their family by selling it as an export crop.

The nature of the variation between the reasons for adoption of cassava and and sex groups of respondents were tested using the Pearson's chi-square test of relationship (Table 4.8). These reasons were first cross-tabulated with the sex of respondents (Table 4.8) in order to ascertain any form of significance of the variation.

At a set significance level of 0.05, and a confidence interval of 95%, the Chi-square test revealed that there is a significant variation (Chi Square= 14.861, Sig. =.021).

Hence, it can be deduced that the adoption of cassava varies significantly between sex groups.

Table 4.3. Reasons for the Adoption of Cassava between Sex Groups

Reasons for adoption		Sex		Aggregate
		Male	Female	
Financial Reasons	Number	846	873	1719
	Percentage	46.07%	41.0%	43.3%
To feed my family Consumption	Number	246	328	574
	Percentage	13.4%	15.4%	14.5%
Usual crop cultivated by my Ethnic group	Number	172	222	394
	percentage	9.4%	10.4%	9.9%
Encouragement from Government	Number	11	22	33
	Percentage	0.6%	1.03%	0.8%
Easy to Cultivate	Number	8	16	24
	Percentage	0.4%	0.75%	0.6%
Financial Reason and to Feed	Number	543	652	1195
	Percentage	29.5%	30.6%	30.1%
In Demand in Market	Number	10	17	27
	Percentage	0.5%	0.8%	0.7%
Total	Number	1836	2130	3966
	Percentage	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.4 indicates the variation among the reasons for adoption of cassava and marital status groups. The observation revealed that in examining the variation between marital status and the reasons of adoption of cassava, there are more married respondents who cultivate cassava for financial reasons. A total of 1,712 respondents accounted for 43.5%, they stated cultivate cassava for the financial reasons; and out of the 1,712 respondents which account for the largest portion of the total count of respondents, married adopters accounted for 20.8% (820 respondents). Single adopters accounted for 19.3% (759 respondents) and, divorced adopters accounted for 1.8% (69 respondents), while the widowed adopter accounted for 1.6% (64 respondents).

Apart from the financial reasons alone for adoption of cassava, the second reason was a combination of both financial reasons and to feed accounted for the second largest section in this category accounting for 30.1% (1,186 respondents) of the 3,934 respondents considered in this section. Despite the financial benefits and reasons to feed, the others reasons are equally important. In fact, among the other reasons, encouragement from the government, more demand, and easy cultivation are other factors accounting for 0.8% (33 respondents), 0.7% (27 respondents), and 0.6% (24 respondents) respectively and they represent the minor portion of the reasons considered in the study area.

The nature of the variation among reasons of adoption of cassava and marital status of respondents was tested using Pearson's chi-square test of a relationship. These reasons were first cross-tabulated with the marital status of respondents (Table 4.8) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, the chi-square test revealed that there is a significant variation (Chi square= 351.361, sig. =.000). Hence, it can be deduced that the adoption of cassava varies significanltly among marital status groups.

Table 4.4. Reasons for the Adoption of Cassava among Marital Status Groups

Reason for Adoption		Marital Status Groups				Aggregate
		Married	Single	Divorced	Widowed	
Financial Reasons	Number	820	759	69	64	1712
	Percentage	38.5%	52.3%	41.6%	34.2%	43.5%
To feed my family	Number	290	197	21	50	558
	Percentage	13.6%	13.6%	12.5%	26.7%	14.2%
Usual crop cultivated buy my Ethnic group	Number	223	90	32	49	394
	Percentage	10.5%	6.2%	19.2%	26.2%	10.0%
Encouragement from Government	Number	22	0	11	0	33
	Percentage	1.03%	0%	6.6%	0%	0.8%
Easy to Cultivate	Number	7	8	0	9	24
	Percentage	0.3%	0.5%	0%	4.8%	0.6%
Financial Reason and to feed	Number	752	386	33	15	1186
	Percentage	35.3%	26.6%	19.9%	8.02%	30.1%
In Demand in market	Number	17	10	0	0	27
	Percentage	0.8%	0.7%	0%	0%	0.7%
Total	Number	2131	1450	166	187	3934
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.5 indicates the variation of the reasons for adoption of cassava among annual income groups of respondents. Financial benefits can be said to be the main reason for the adoption of cassava by farmers as reported by the respondents.For the farmers in south-eastern Côte d'Ivoire, cassava represents what is known as *''white gold''* and it is now perceived as the main culture that aids them (respondents) to get money especially for the women. Out of the total respondents of 4,000, only 3,778 stated the average amount they earn from cassava annually and this number formed the basis for the analysis in this section (Table 4.5). Financial reasons accounted for 42.7% (1613 respondents) and out of these 511 of respondents (13.6%) stated that they earn less than 121 000 FCFA (which is about 70 000 NGN), 401 respondents (10.6%) earn above 201 000 FCFA (about 130 000 NGN). Most of the respondents cultivate only cassava for a period of six months for sales in order to get more profit and revenue. According to the respondents, this amount fluctuates, and it depends on elements of weather and climate as well as the species and varieties of cassava. Financial reasons and to feed together account for the second aspect of the reasons of adaoption and cultivation of cassava. Among the 1,179 (31.2%) respondents of the total 3,778 that respondent in this section; 534 respondents (14.1%) earn an average annual income of less than 121 000 FCFA while 122 respondents (3.2%) stated that they earn above 201 000 FCFA. This might be attributed to the fact that some of the respondents do not have a big area of land to develop and produce cassava alongside some other issues as pointed out in the problems faced during adoption and cultivation respectively. Some of the respondents stated that the reasons of adoption of cassava is its ease of cultivation and they account for 0.4% (16 respondents) and this account for the least reason why cassava is being cultivated in the study area. Cassava in south-eastern Côte d'Ivoire has been part of the ancient culture and practice of cassava cultivation, but after 1980, cassava cultivation obtained a new orientation and its cultivation is now based on the identified reasons specifically for a financial reason, alongside its usage by the population for food consumption. The nature of the variation among the reasons of cassava adoption and annual income groups from the respondents were tested using the chi-square test of relationship (Table 4.8). At a set probability level of 0.05, and a confidence interval of 95%, the Chi-square test revealed that there is a significant variation (Chi Square= 772.924, Sig. =.000), among the reasons for cassava adoption and annual income of respondents. Hence, it can be deduced that the adoption of cassava varies significantly among annual income groups.

Reasons for adoption		Annual Income from Cassava						Aggregate
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Financial Reasons	Number	511	218	64	98	321	401	1613
	Percentage	32.7%	33.1%	30.9%	32.4%	66.4%	71%	42.7%
To feed my family Consumption	Number	348	69	27	28	30	22	524
	Percentage	22.2%	10.5%	13.04%	9.3%	6.2%	3.9%	13.9%
Usual crop cultivated by my Ethnic group	Number	142	143	40	28	17	16	386
	Percentage	9.07%	21.8%	19.3%	9.3%	3.5%	2.8%	10.2%
Encouragement from Government	Number	0	29	0	0	0	4	33
	Percentage	0.0%	4.4%	0.0%	0.0%	0.0%	0.7%	0.9%
Easy to Cultivate	Number	16	0	0	0	0	0	16
	Percentage	1.02%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Financial Reason and to Feed	Number	534	198	76	145	104	122	1179
	Percentage	34.1%	30.1%	36.7%	48.01%	21%	21.6%	31.2%
In Demand in Market	Number	13	0	0	3	11	0	27
	Percentage	0.8%	0.0%	0.0%	0.9%	2.3%	0.0%	0.7%
Total	Count	1564	657	207	302	483	565	3778
	% of Total	100%	100%	100%	100%	100%	100%	100.0%

Table 4.5. Reasons for the Adoption of Cassava among Annual Income Groups

Source: Researcher's Analysis (2018).

Table 4.6 indicates the variation among the reason for adoption of cassava and education level groups. In the country of study, for instance, a good number of people think that adoption of food crops is for those who did not have a formal education (Kouakou, 2014). However, this study was able to prove otherwise, and establish this thought pattern as ancient. Out of the total respondents of 4,000, only 3,873 stated their level of education; and this number formed the basis for the analysis in this section. The farmers who cultivated cassava for financial reasons only accounted for 43.2% (1675 respondents) and out of these 420 respondents (13.6%) stated that they did not have any formal education. A total of 702 respondents (18.1%) stated that they have only primary education, 443 respondents (11.4%) stated that they have secondary education, while 110 respondents (2.8%) have tertiary education. The second reason was both financial reason and to feed. Indeed, the second aspect of reasons accounted 1,149 (29.7%) respondents of the total 3,873 that responded in this section; 511 respondents (13.2%) stated that they did not have any formal education, 417 respondents (10.8%) stated that they have only primary education, 206 respondents (5.3%) stated that they have secondary education, while 15 respondents (0.4%) stated that they have tertiary education. Some of the respondents stated they cultivate because of its ease of cultivation and it accounted for 0.6% (24 respondents) and this account for the least reason why cassava is being cultivated in the study area. The educated respondents irrespective of their level of education (Primary = 38.9%, Secondary =21.3%, and Tertiary = 6.0%) form a bulk of the total respondents it accounted for 66.2% of all the respondents considered in the section while 33.8% represents the portion of respondents with no formal education. A possible reason for the above is that with more education, the respondents are able to understand the constant developments taking place in the cultivation of cassava as well as advancements in the improvements in the species and varieties of viable cassava stem to better productivity; knowledge of the latest methods being introduced by the extension program the Ministry of Agriculture in the study area.

From this observation, this study show the reasons for the adoption of cassava to the research results of Kouakou (2014). The author, in rural education level has an impact in the development of food production. In addition, it is felt that peasants can neither read nor write, and that is why they are not receptive to agricultural innovations. Table

4.8 indicates the variation among the reasons of adoption of cassava and educational level of respondents. This was tested using the chi-square test of relationship. At a set probability level of 0.05, and a confidence interval of 95%, the chi-square test revealed that there is a significant variation (Chi Square= 413.270, Sig. =.000), among the reasons and educational level of respondents. Hence, it can be deduced that adoption of cassava varies significantly among educational level of respondents.

Reason for adoption		Education				Aggregate
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Financial Reasons	Number	420	702	443	110	1675
	Percentage	32.1%	46.5%	53.6%	47.4%	43.2%
To Feed my family Consumption	Number	250	150	100	80	580
	Percentage	19.1%	9.9%	12.1%	34.4%	15.0%
Usual crop cultivated by my Ethnic group	Number	85	225	56	19	385
	Percentage	6.5%	14.9%	6.77%	8.1%	9.9%
Encouragement from Government	Number	29	0	4	0	33
	Percentage	2.2%	0.0%	0.4%	0.0%	0.9%
Easy to Cultivate	Number	9	0	7	8	24
	Percentage	0.7%	0.0%	0.8%	3.4%	0.6%
Financial Reason and to feed	Number	511	417	206	15	1149
	Percentge	39.09%	27.6%	24.9%	6.5%	29.7%
In Demand in Market	Number	3	14	10	0	27
	Percentage	0.22%	0.9%	1.2%	0.0%	0.7%
Total	Number	1307	1508	826	232	3873
	Percentage	100%	100%	100%	100%	100.0%

Table 4.6. Reasons for the Adoption of Cassava among Educational Level Groups

Source: Researcher's Analysis (2018).

Table 4.7 indicates the variation among the reasons of adoption of cassava and number of children. The respondents that have many children use them as labour because farm labour is expensive. The number of children is another socio-economic factor that aid in the understanding of the reasons for cassava adoption. Farmers who cultivated cassava for financial reasons accounted for 44.2% (1,711 respondents) and out of these 239 respondents (6.2%) stated that they did not have any children, 352 respondents (9.1%) stated that they have less than 3 children, 570 respondents (14.7%) stated they have between 3 and 5 children, while 550 respondents (14.2%) stated that they have more than 5 children. Some of the respondents stated that they cultivate for both financial reasons and to feed is the second reason. Among the 1,141 respondents of the total 3,869 that responded in this section; 58 respondents stated that they did not have any children, 332 respondents stated that they have less than 3 children, 315 respondents (stated that they have between 3 and 5 children, while 446 respondents stated that they have above 5 children). On the other hand, it can be observed that those with 3 and 5 children and above five children (3 and 5 children = 31.8%, Above 5 = 34.0%) form a bulk of the total count of respondents, and in total accounted for 65.8% of all the respondents considered in the section while the remaining 34.2% represents the portion of respondents with less than 3 children or none (no children = 10.5%, less than 3 children = 23.7%).

A possible reason for the above is with more children, the respondents are usually able to achieve more work which is carried out at minimal capital while expecting maximum profits and benefits. Table 4.8 shows the variation among the reason for adoption of cassava and number of children of respondents. This was tested using the chi-square test of relationship. At a set probability level of 0.05, and a confidence interval of 95%, the chi-square test revealed that there is a significant variation (Chi Square= 218.604, Sig. =.000), among the reasons and number of children of respondents. Hence, it can be deduced that the adoption of cassava varies significantly among number of children of respondents.

Table 4.7. Reasons for the Adoption of Cassava among Number of Children Groups

Reasons for Adoption		Number of Children groups				Aggregate
		None	Less than 3	3 - 5	Above 5	
Financial Reasons	Number	239	352	570	550	1711
	Percentage	58.9%	38.4%	46.4%	41.8%	44.2%
To Feed my family Consumption	Number	66	89	177	207	539
	Percentage	12.2%	9.7%	14.4%	15.7%	13.9%
Usual crop cultivated by my Ethnic group	Number	43	109	139	103	394
	Percentage	10.5%	11.9%	11.3%	7.82%	10.2%
Encouragement from Government	Number	0	11	11	11	33
	Percentage	0.0%	1.2%	0.9%	0.8%	0.9%
Easy to Cultivate	Number	0	24	0	0	24
	Percentage	0.0%	2.6%	0.0%	0.0%	0.6%
Financial Reason and to Feed	Number	58	322	315	446	1141
	Percentage	14.3%	35.1%	25.6%	38.9%	29.5%
In Demand in Market	Number	0	10	17	0	27
	Percentage	0.0%	1.1%	1.4%	0.0%	0.7%
Total	Number	406	917	1229	1317	3869
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.8. Chi-square result of variation of adoptionof cassava among socio-economics groups

<table>
<tr><th rowspan="2">Reasons of adoption of cassava</th><th colspan="4">Chi-square Result across the districts</th></tr>
<tr><th>Socio-economics Characteristics</th><th>Chi-square X^2</th><th>Df</th><th>Level of significance</th></tr>
<tr><td rowspan="6">Financial Reasons
For Food and Consumption
Cultivated by Ethnic group
Encouragement from Government
Financial Reason and Food consumption
More Demand</td><td>Age</td><td>483.061</td><td>30</td><td>Varies significantly</td></tr>
<tr><td>Sex</td><td>14.861</td><td>6</td><td>Varies significantly</td></tr>
<tr><td>Marital status</td><td>351.361</td><td>18</td><td>Varies significantly</td></tr>
<tr><td>Annual Income</td><td>722.924</td><td>30</td><td>Varies significantly</td></tr>
<tr><td>Education Level</td><td>413.270</td><td>18</td><td>Varies significantly</td></tr>
<tr><td>Number of Children</td><td>218.604</td><td>18</td><td>Varies significantly</td></tr>
</table>

Source: Researcher’s Analysis (2018).

4.5. Variation of the Reason of Adoption of Cassava across the Districts

The variation of the reasons of adoption for cassava was examined by the district as a whole and was tested using the one-way analysis of variance (Table 4.9).

The observation in Figure 4.21 shows the reasons for the adoption of cassava. According to the individuals surveyed in south-eastern Côte d'Ivoire. These reasons were given so as to highlight the variation in reasons for adoption and cultivation of cassava at the district level.

The main reason for the adoption of cassava in south-eastern Côte d'Ivoire is the financial reason. Indeed, Figure 4.21 shows that it is the district of Lagunes with more than 600 surveys that engage in it for money. In the second place, the Comoé district with 580 respondent followed by the Lacs district with 530 adopters of cassava crop.

As for the financial reason and to feed, the district of Comoé that occupies the most respondents with more than 500 respondents followed by the district of Lacs with 480 respondents. The district of Lagunes has less than 200 respondents.

Overall, the general observation is that variability among the detractors of the adoption and cultivation of cassava at the district level is apparent. Each reason vary from a district to another district according to criteria that are specific to it.

The statistical test was carried out at a given probability level of 0.05 and confidence level of 95%. Based on the result of the anlysis (Table 4.9), the reasons of adoption of cassava varies significantly across the districts (F=56.796, Sig.= 0.000). Thus, one can infer that the variation may be due to the diversity of respondents across the three districts that constitute the study area.

Furthermore, another possible reason might be individual differences that might have ensued based on the background of respondents.

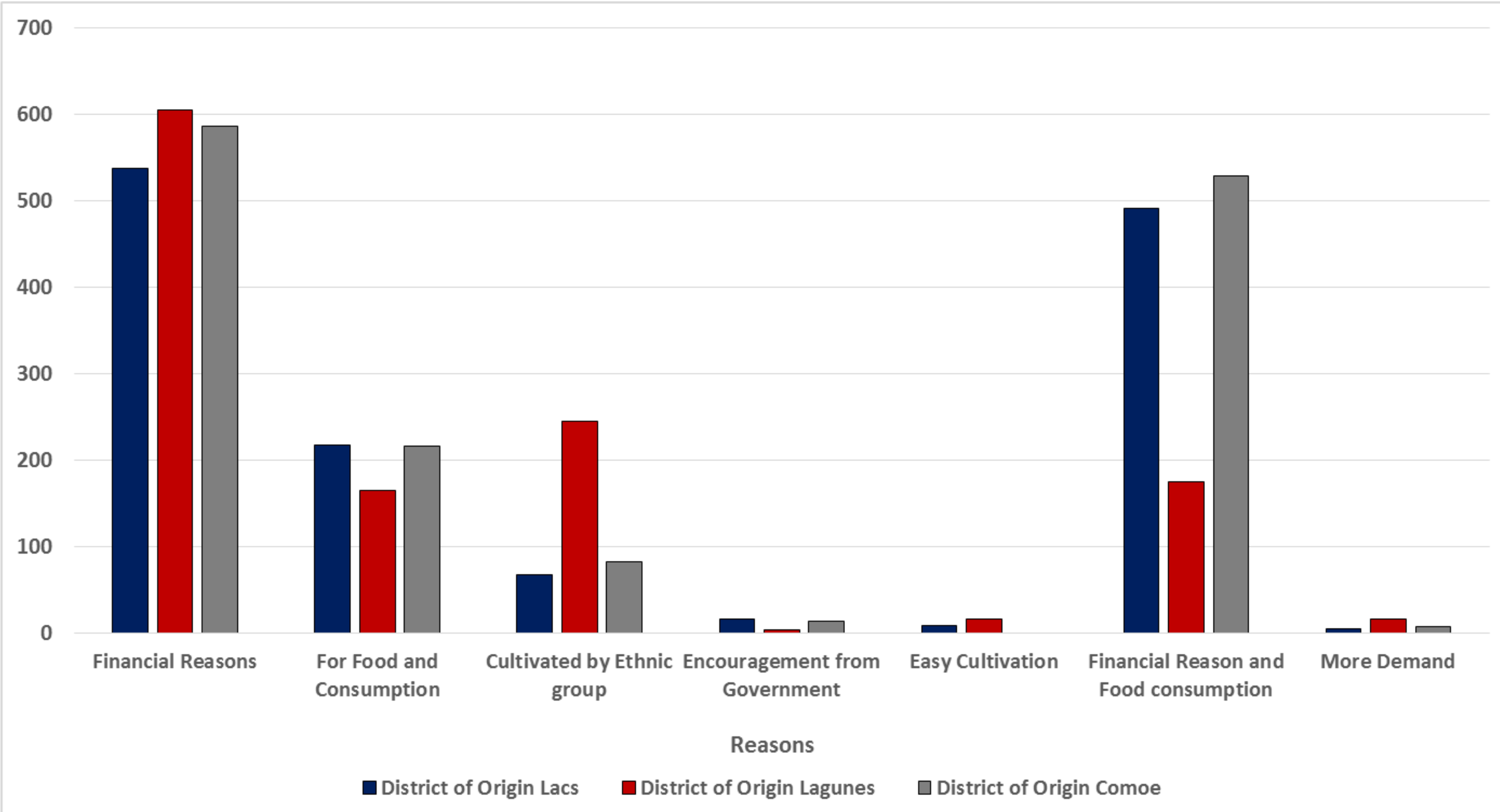

Figure 4.21 **Reasons of Adoption of Cassava across Districts**

Source: Researcher's Fieldwork, 2018

Table 4.9. Variation of Adoption across the Districts

ANOVA

Adoption of cassava vary significantly among socio-economic groups					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	519.796	2	259.898	56.796	.000
Within Groups	18290.323	3997	4.576		
Total	18810.119	3999			

Source: Researcher's Analysis (2018).

4.6. Variation of Reasons of Adoption of Cassava across each District

4.6.1. District of Comoé

Table 4.10 indicates the reasons of adoption of cassava and the age groups in the Comoé district. With regard to age 595 (40.8%) respondents indicated they cultivated cassava due to financial reasons from which 159 (10.9%) aged 31-40 years. The second reason is financial reason and to feed. The majority age groups is also (31-40) years old, following by (41-50) with 128 respondents. The third reason for adoption of cassava is for food consumption. The majority age group is between 31-40 years old. It is followed by the 51-60 age group. Lastly, the reason in the adoption of cassava is this crop is practiced just for more demand. For this reason, the most significant age group is over 60 years old. In the Comoé district, the most dynamic age group is between 31-40 years old. This age group is engaged in the practice of growing cassava just for financial reasons. Reasons for adoption of cassava were cross tabulated with age of respondents to ascertain the significance of the variation. The Chi square test result, Table 4.16 indicates that at a given probability level of 0.05 and confidence level of 95%, that the reasons for adopting cassava significantly differs across Comoé on the basis of age given that X^2=239.517; df =25, p=0.000.

Table 4.10. Reasons for the Adoption of Cassava among Age Groups in Comoé District

Reasons for adoption of cassava		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Financial Reasons	Count	10	113	159	148	85	80	595
	% of Total	0.7%	7.8%	10.9%	10.2%	5.8%	5.5%	40.8%
For Food and Consumption	Count	25	40	53	30	47	24	219
	% of Total	1.7%	2.7%	3.6%	2.1%	3.2%	1.6%	15.0%
Cultivated by Ethnic group	Count	0	8	23	38	8	8	85
	% of Total	0.0%	0.5%	1.6%	2.6%	0.5%	0.5%	5.8%
Encouragement from Government	Count	0	0	8	0	0	7	15
	% of Total	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%	1.0%
Financial Reason and to Feed	Count	0	108	189	128	71	40	536
	% of Total	0.0%	7.4%	13.0%	8.8%	4.9%	2.7%	36.8%
More Demand	Count	0	0	0	0	0	8	8
	% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.5%
Total	Count	35	269	432	344	211	167	1458
	% of Total	2.4%	18.4%	29.6%	23.6%	14.5%	11.5%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.11 shows the reasons for cassava adoption between sex of the respondents. Five hundred and ninty-five (41%) of the respondents indicated that financial reason is the main motivation of the adoption of cassava in Comoé district. There were 322 (22.2%) male and 273 female (18.8%). For the second reason, 278 (19.2%) female respondents affirmed their finances and to feed as a reason; while 111 (7.7%) male respondents reported for food consumption only and 62 (4.3%) females indicated cassava cultivation was due to the usual fact that it was the crop cultivated by the ethnic group. Reasons for adoption of cassava were cross tabulated with sex of respondents to ascertain the significance of the variation. The chi square test result in Table 4.16 indicates that at a given probability level of 0.05 and confidence level of 95%. The chi square test indicates that the adoption of cassava in Comoé district varies significantly on the basis of sex given that X^2=31.292; df =5, p=0.000.

Table 4.12 indicates the reason of adoption of cassava among marital status groups of respondents.Five hundred and eighty seven (40.9%) of the respondents claimed their adoption of cassava was due to their financial situation from which there were 345 (24.1%) married respondents. 142 (9.9%) single respondents were of the opinion that financial reasons and to feed was the reason. Eight (0.6%) widowed respondents confirmed they cultivated cassava because it was the usual crop cultivated by their ethnic group. Reasons for adoption of cassava were cross tabulated with marital status groups of respondents in the district of Comoé to ascertain the significance of the variation. Table 4.16 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation between reasons for adoption of cassava and marital status of respondents across Comoé given that X^2=165.526; df =15, p=0.000. Hence, it can be deducted that the adoption of cassava varies significantly among marital statuts groups in Comoé district.

Table 4.11 Reasons Adoption of Cassava between Sex Groups in Comoé District

Reasons for the Adoption of Cassava		Sex groups		Total
		Male	Female	
Financial Reasons	Count	322	273	595
	% of Total	22.2%	18.8%	41.0%
For Food and Consumption	Count	111	100	211
	% of Total	7.7%	6.9%	14.6%
Usual crop cultivated by Ethnic group	Count	23	62	85
	% of Total	1.6%	4.3%	5.9%
Encouragement from Government	Count	8	7	15
	% of Total	0.6%	0.5%	1.0%
Financial Reason and to Feed	Count	258	278	536
	% of Total	17.8%	19.2%	37.0%
More Demand	Count	0	8	8
	% of Total	0.0%	0.6%	0.6%
Total	Count	722	728	1450
	% of Total	49.8%	50.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.12 **Reasons for Cassava adoption among Marital Status groups in Comoé District**

Reasons for the Adoption of Cassava		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Financial Reasons	Count	345	218	24	0	587
	% of Total	24.1%	15.2%	1.7%	0.0%	40.9%
For Food and Consumption	Count	121	64	3	23	211
	% of Total	8.4%	4.5%	0.2%	1.6%	14.7%
Usual crop cultivated by Ethnic group	Count	38	31	8	8	85
	% of Total	2.6%	2.2%	0.6%	0.6%	5.9%
Encouragement from Government	Count	15	0	0	0	15
	% of Total	1.0%	0.0%	0.0%	0.0%	1.0%
Financial Reason and to feed	Count	369	142	17	0	528
	% of Total	25.7%	9.9%	1.2%	0.0%	36.8%
More Demand	Count	8	0	0	0	8
	% of Total	0.6%	0.0%	0.0%	0.0%	0.6%
Total	Count	896	455	52	31	1434
	% of Total	62.5%	31.7%	3.6%	2.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.13 indicates the reasons for adoption of cassava among annual income groups in Comoé district. With regard to annual income from cassava, where it is evident that 571 (40.7%) respondents indicated their finances as the reason for adopting cassava from which 168 (12%) respondents earned less than 121,000FCFA annually. The second reason was based on finance and consunption. This reason accounted for 536 with the annual income less than 120,000 FCFA. The third fundamental reason for the adoption of cassava in the Comoé district is for food consumption. The surveys engaged in this crop for this reason have an annual income of less than 120,000 CFA francs. As for the last reason for the adoption of cassava, i.e for more demand, the populations engaged in this practice have an income between 180,000 and 200,000 CFA francs. Reasons for adoption of cassava were cross tabulated with annual income of respondents in Comoé district to ascertain the significance of the variation. The chi square test result, Table 4.16 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly on the basis of annual income of respondents across Comoe (X^2=316.499; df =25, p=0.000).

The reasons for adoption of cassava among educational level of respondents are presented in Table 4.14. Five hundred and seventy four (41.8%) respondents indicating their financial circumstances as the main reason for the adoption of cassava from which 306 (22.3%) had primary education and 152 (11.1%) had secondary education. Two hundred and twenty-eight (16.6%) respondents with primary education affirmed cultivation of cassava was due to financial reasons and to feed. Twenty-four (1.7%) tertiary graduates indicated for food consumption only as the reason for cultivating cassava. Table 4.16 shows the reasons of adoption of cassava among the educational level of respondents. The chi square test indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly among the educational level of respondents across Comoe (X^2=237.131; df =15, p=0.000).

Table 4.13 **Reasons for the Adoption of Cassava among Annual Income Groups in Comoé District**

Reasons for the Adoption of Cassava		Annual Income from Cassava						Total
		<121 000 FCFA	**121 000-140 000 FCFA**	**141 000-160 000 FCFA**	**161 000-180 000FCFA**	**181 000-200 000FCFA**	**>201 000FCFA**	
Financial Reasons	Count	168	104	9	55	99	136	571
	% Total	12.0 %	7.4%	0.6%	3.9%	7.1%	9.7%	40.7%
For Food and Consumption	Count	133	23	8	8	16	7	195
	% Total	9.5%	1.6%	0.6%	0.6%	1.1%	0.5%	13.9%
Usual crop cultivated by Ethnic group	Count	15	16	8	15	8	15	77
	% Total	1.1%	1.1%	0.6%	1.1%	0.6%	1.1%	5.5%
Encouragement from Government	Count	0	15	0	0	0	0	15
	% Total	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	1.1%
Financial Reason and to Feed	Count	189	112	44	83	43	65	536
	% Total	13.5 %	8.0%	3.1%	5.9%	3.1%	4.6%	38.2%
More Demand	Count	0	0	0	0	8	0	8
	% Total	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.6%
Total	Count	505	270	69	161	174	223	1402
	% ofTotal	36.0 %	19.3 %	4.9%	11.5%	12.4%	15.9%	100.0 %

Source: Researcher's Analysis (2018).

Table 4.14 Reasons for the Adoption of Cassava Among Education Level Groups in Comoé District

Reasons for the Adoption of Cassava		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Financial Reasons	Count	92	306	152	24	574
	% of Total	6.7%	22.3%	11.1%	1.7%	41.8%
For Food and Consumption	Count	88	73	18	24	203
	% of Total	6.4%	5.3%	1.3%	1.7%	14.8%
Cultivated by Ethnic group	Count	0	62	7	8	77
	% of Total	0.0%	4.5%	0.5%	0.6%	5.6%
Encouragement from Government	Count	15	0	0	0	15
	% of Total	1.1%	0.0%	0.0%	0.0%	1.1%
Financial Reason and Food consumption	Count	165	228	103	0	496
	% of Total	12.0%	16.6%	7.5%	0.0%	36.1%
More Demand	Count	0	8	0	0	8
	% of Total	0.0%	0.6%	0.0%	0.0%	0.6%
Total	Count	360	677	280	56	1373
	% of Total	26.2%	49.3%	20.4%	4.1%	100.0%

Source: Researcher's Analysis (2018).

Table 4.15 shows the reason of adoption of cassava among number of children groups in Comoé district. Five hundred and seventy-nine (41.8%) respondents were of the opinion that their financial circumstances was the reason why they chose to cultivate cassava instead of other crops from which 207 (14.9%) respondents claimed to have 3-5 children. One hundred and sixty-four (11.8%) respondents with less than 3 children confirmed their finances and to feed as the reason they chose cassava. Fifty-three (3.8%) respondents with more than 5 children reported food consumption only as the reason for cultivating cassava. Reasons for cassava adoption were cross tabulated with number of children groups of respondents in Comoé district to ascertain the significance of the variation (Table 4.16). The result of the chi square test indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly among number of children of respondents across Comoé (X^2=71.012; df =15, p=0.000).

Table 4.15 Reasons for cassava Adoption among Number of Children Groups in Comoé District

Reasons for the Adoption of Cassava		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Financial Reasons	Count	17	167	207	188	579
	% of Total	1.2%	12.0%	14.9%	13.6%	41.8%
For Food and Consumption	Count	16	37	81	53	187
	% of Total	1.2%	2.7%	5.8%	3.8%	13.5%
Usual crop cultivated by Ethnic group	Count	8	8	46	23	85
	% of Total	0.6%	0.6%	3.3%	1.7%	6.1%
Encouragement from Government	Count	0	8	0	7	15
	% of Total	0.0%	0.6%	0.0%	0.5%	1.1%
Financial Reason and to Feed	Count	25	164	162	161	512
	% of Total	1.8%	11.8%	11.7%	11.6%	36.9%
More Demand	Count	0	0	8	0	8
	% of Total	0.0%	0.0%	0.6%	0.0%	0.6%
Total	Count	66	384	504	432	1386
	% of Total	4.8%	27.7%	36.4%	31.2%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.16 Chi-square Result of Variation of Reasons of Adoption of Cassava in District of Comoé

Reasons of adoption of cassava	District of Comoé			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Financial Reasons	Age	239.517	25	Varies significantly
For Food and Consumption	Sex	31.292	5	Varies significantly
Cultivated by Ethnic group	Marital status	165.526	15	Varies significantly
Encouragement from Government	Annual Income	316.499	25	Varies significantly
Financial Reason and Food consumption	Education Level	237.131	15	Varies significantly
More Demand	Number of Children	71.012	15	Varies significantly

Source: Researcher's Analysis (2018).

4.6.2. District of Lacs

Table 4.17 indicates the reasons for adoption of cassava among age groups in district of Lacs. The first reason for adopting cassava was financial reason and we have 538 (40.3%) of respondents choosing to cultivate cassava from which there were 171 (12.8%) respondents aged 51-60 years. One hundred and seventeen (8.8%) with the age groups (31-40) are those adopting cassava from both financial reason and to feed 92 (6.9%) respondents aged 31-40 claimed cassava cultivation was for food consumption only and 20 (1.5%) respondents aged 41-50 indicated cassava cultivation was due to their usual crop cultivated by the ethnic group. Reasons for adoption of cassava were cross tabulated with age groups of respondents to ascertain the significance of the variation. The Chi square test result in Table 4.23 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adopting cassava varies significantly across Lacs among age groups given that X^2=222.899; df =30, p=0.000.

Table 4.18 shows the reasons for adoption of cassava between sex groups in the district of Lacs. Five hundred and twenty-eight (39.9%) respondents indicated their finances as the reason for adopting cassava in which there were 326 (24.6%) female agaisnt 202 male respondents. Two hundred and ninty-one (22%) of female respondents affirmed their finances and to feed as a second reason. Sixty-two of the (4.7%) male respondents reported for food consumption only and 4 (0.3%) females indicated adopting cassava due to more demand, and it is the last reason for the adoption and cultivation of cassava.

Reasons for adoption of cassava were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the Chi square test in Table 4.23 indicates at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly across Lacs on the basis of sex given that X^2=78.444; df =6, p=0.000.

Table 4.17. Reasons for the adoption of cassava among age groups in Lacs district

Reasons for the Adoption of Cassava		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Financial Reasons	Count	21	63	102	111	171	70	538
	% of Total	1.6%	4.7%	7.6%	8.3%	12.8%	5.2%	40.3%
For Food and Consumption	Count	13	3	92	46	21	42	217
	% of Total	1.0%	0.2%	6.9%	3.4%	1.6%	3.1%	16.3%
Usual crop cultivated by Ethnic group	Count	0	12	23	20	12	0	67
	% of Total	0.0%	0.9%	1.7%	1.5%	0.9%	0.0%	5.0%
Encouragement from Government	Count	0	0	1	0	15	0	16
	% of Total	0.0%	0.0%	0.1%	0.0%	1.1%	0.0%	1.2%
Easy Cultivation	Count	0	0	8	0	0	0	8
	% of Total	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.6%
Financial Reason and to Feed	Count	0	75	117	98	113	81	484
	% of Total	0.0%	5.6%	8.8%	7.3%	8.5%	6.1%	36.3%
More Demand	Count	0	3	0	0	0	1	4
	% of Total	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%	0.3%
Total	Count	34	156	343	275	332	194	1334
	% of Total	2.5%	11.7%	25.7%	20.6%	24.9%	14.5%	100.0%

Source: Researcher's Analysis (2018).

Table 4.19 shows the reasons for adoption of cassava among marital status groups across Lacs district.A total of 537 (40.8%) respondents claimed cassava cultivation was due to their financial situation from which there were 242 (18.4%) single respondents while 291 (22.1%) married respondents were of the opinion that financial reasons and to feeding was the second reason. For the sole reason of food consumption we have 80 (6.1%) single respondents. Eleven (0.8%) divorced respondents confirmed they cultivated cassava because they got encouragement from the government. Table 4.23 indicates the reasons for adoption of cassava among marital status groups in Lacs district. This were cross tabulated to ascertain the significance of the variation. The result of the Chi square test indicates that at a given probability level of 0.05 and confidence level of 95 there is a significant variation between reasons for adoption of cassava and marital status of respondents across Lacs given that X^2=232.610; df =18, p=0.000.

Table 4.20 shows the reasons for adoption of cassava among annual income groups from cassava across Lacs district. It is evident that 476 (39.9%) respondents indicated their finances and food consumption as the main reason for cultivating cassava from which 291 (24.4%) respondents earned less than 121,000 FCFA annually. The second was financial reason and 215 (18.0%) of respondents earned less 121,000 FCFA (Francs de la Communauté Financière Africaine). Sixty seven (5.6%) earn 121,000-140,000 FCFA reported their finances only as the reason for cultivating cassava and 4 (0.3%) respondents earning more than 200,000 FCFA annually affirmed that cassava cultivation was due to encouragement received from government. Reasons for cassava adoption among annual income groups of respondents were cross tabulated to ascertain the significance of the variation. The result of the chi square test in Table 4.23 indicates at a given probability level of 0.05 and confidence level of 95%, that reasons for adoption of cassava varies significantly on the basis of annual income of respondents across Lacs (X^2=309.581; df =25, p=0.000).

Table 4.18. Reasons for the Adoption of Cassava between Sex Groups in Lacs District

Reasons for the Adoption of Cassava		Sex groups		Total
		Male	Female	
Financial Reasons	Count	202	326	528
	% of Total	15.3%	24.6%	39.9%
For Food and Consumption	Count	62	147	209
	% of Total	4.7%	11.1%	15.8%
Usual crop cultivated by Ethnic group	Count	54	13	67
	% of Total	4.1%	1.0%	5.1%
Encouragement from Government	Count	1	15	16
	% of Total	0.1%	1.1%	1.2%
Easy Cultivation	Count	8	0	8
	% of Total	0.6%	0.0%	0.6%
Financial Reason and to Feed	Count	200	291	491
	% of Total	15.1%	22.0%	37.1%
More Demand	Count	0	4	4
	% of Total	0.0%	0.3%	0.3%
Total	Count	527	796	1323
	% of Total	39.8%	60.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.19. Reasons for the Adoption of Cassava among Marital Status Groups in Lacs District

Reasons for the Adoption of Cassava		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Financial Reasons	Count	239	242	28	28	537
	% of Total	18.2%	18.4%	2.1%	2.1%	40.8%
For Food and Consumption	Count	97	80	8	8	193
	% of Total	7.4%	6.1%	0.6%	0.6%	14.7%
Cultivated by Ethnic group	Count	42	24	1	0	67
	% of Total	3.2%	1.8%	0.1%	0.0%	5.1%
Encouragement from Government	Count	5	0	11	0	16
	% of Total	0.4%	0.0%	0.8%	0.0%	1.2%
Easy Cultivation	Count	0	8	0	0	8
	% of Total	0.0%	0.6%	0.0%	0.0%	0.6%
Financial Reason and Food consumption	Count	291	180	4	15	490
	% of Total	22.1%	13.7%	0.3%	1.1%	37.3%
More Demand	Count	4	0	0	0	4
	% of Total	0.3%	0.0%	0.0%	0.0%	0.3%
Total	Count	678	534	52	51	1315
	% of Total	51.6%	40.6%	4.0%	3.9%	100.0%

Source: Researcher's Analysis (2018).

Table 4.21 indicates the reasons for adoption of cassava among eduction level groups across Lacs district. 514 (39.3%) respondents indicating their financial reason as the main reason for cultivation of cassava from which 193 (14.7%) had no formal education. Among this reason, 151 (11.5%) of respondents had primary education and 75 (5.7%) had tertiary education. One hundred and thirty-nine (10.4%) of the respondents with only primary education affirmed cultivation of cassava was due to financial reasons and food consumption and 55 (4.2%) tertiary graduates indicated food consumption only as the reason for cultivating cassava.

Reasons for cassava adoption among educational level groups were cross tabulated to ascertain the significance of the variation. The result of the chi square test in Table 4.23 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significaltly among the educational level of respondents across Lacs (X^2=299.157; df =18, p=0.000).

Table 4.20. Reasons for the Adoption of Cassava among Annual Income Groups

Reasons for the Adoption of Cassava		Annual Income from Cassava groups						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Financial Reasons	Count	215	67	36	41	38	65	462
	% of Total	18.0%	5.6%	3.0%	3.4%	3.2%	5.4%	38.7%
For Food and Consumption	Count	112	14	9	20	5	8	168
	% of Total	9.4%	1.2%	0.8%	1.7%	0.4%	0.7%	14.1%
Cultivated by Ethnic group	Count	1	34	23	1	8	0	67
	% of Total	0.1%	2.8%	1.9%	0.1%	0.7%	0.0%	5.6%
Encouragement from Government	Count	0	12	0	0	0	4	16
	% of Total	0.0%	1.0%	0.0%	0.0%	0.0%	0.3%	1.3%
Financial Reason and Food consumption	Count	291	48	15	58	38	26	476
	% of Total	24.4%	4.0%	1.3%	4.9%	3.2%	2.2%	39.9%
More Demand	Count	3	0	0	0	1	0	4
	% of Total	0.3%	0.0%	0.0%	0.0%	0.1%	0.0%	0.3%
Total	Count	622	175	83	120	90	103	1193
	% of Total	52.1%	14.7%	7.0%	10.1%	7.5%	8.6%	100.0%

in Lacs District

Source: Researcher’s Analysis (2018).

Table 4.21. Reasons for the Adoption of Cassava among Education Level Groups in Lacs District

Reasons for the Adoption of Cassava		Education status groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Financial Reasons	Count	193	151	95	75	514
	% of Total	14.7%	11.5%	7.3%	5.7%	39.3%
For Food and Consumption	Count	77	32	51	55	215
	% of Total	5.9%	2.4%	3.9%	4.2%	16.4%
Cultivated by Ethnic group	Count	0	55	0	11	66
	% of Total	0.0%	4.2%	0.0%	0.8%	5.0%
Encouragement from Government	Count	12	0	4	0	16
	% of Total	0.9%	0.0%	0.3%	0.0%	1.2%
Easy Cultivation	Count	0	0	0	8	8
	% of Total	0.0%	0.0%	0.0%	0.6%	0.6%
Financial Reason and to Feed	Count	275	136	60	15	486
	% of Total	21.0%	10.4%	4.6%	1.1%	37.1%
More Demand	Count	3	1	0	0	4
	% of Total	0.2%	0.1%	0.0%	0.0%	0.3%
Total	Count	560	375	210	164	1309
	% of Total	42.8%	28.6%	16.0%	12.5%	100.0%

Source: Researcher's Analysis (2018).

Table 4.22. Reasons for the Adoption of Cassava among Number of Children Groups in Lacs District

Reasons for the Adoption of Cassava		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Financial Reasons	Count	71	50	178	238	537
	% of Total	5.5%	3.8%	13.7%	18.3%	41.2%
For Food and Consumption	Count	19	18	62	94	193
	% of Total	1.5%	1.4%	4.8%	7.2%	14.8%
Usual crop cultivated by Ethnic group	Count	12	45	1	9	67
	% of Total	0.9%	3.5%	0.1%	0.7%	5.1%
Encouragement from Government	Count	0	1	11	4	16
	% of Total	0.0%	0.1%	0.8%	0.3%	1.2%
Easy Cultivation	Count	0	8	0	0	8
	% of Total	0.0%	0.6%	0.0%	0.0%	0.6%
Financial Reason and to Feed	Count	18	117	123	219	477
	% of Total	1.4%	9.0%	9.4%	16.8%	36.6%
More Demand	Count	0	0	4	0	4
	% of Total	0.0%	0.0%	0.3%	0.0%	0.3%
Total	Count	120	239	379	564	1302
	% of Total	9.2%	18.4%	29.1%	43.3%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.22 shows the reasons of adoption of cassava among number of children groups in Lacs district. Five hundred and thirty-seven (41.2%) of the respondents were of the opinion that their financial reason was the reason why they chose to cultivate cassava instead of other crops from which 238 (18.3%) respondents claimed to have more than 5 children. One hundred and seventy-eight (13.3%) have between 3-5 children while 71 (5.5%) do not have. Two hundred and nineteen (16.8%) of the respondents with above 5 children confirmed their finances and feed as the second reason they chose cassava, while 45 (3.5%) respondents with less than 3 children reported cultivating cassava was as a result of their usual crop cultivated by the ethnic group. Reasons for cassava adoption among number of children groups of respondents were cross tabulated to ascertain the signficance of the variation. The result of the Chi square test (Table 4.23) indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly on the basis of number of children of respondents across Lacs (X^2=256.511; df =18, p=0.000).

Table 4.23 Chi-square Result of Variation of Reasons of Adoption of Cassava in District of Lacs

Reasons of adoption of cassava	District of Lacs			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Financial Reasons	Age	222.899	30	Varies significantly
For Food and Consumption	Sex	78.444	6	Varies significantly
Cultivated by Ethnic group	Marital status	232.610	18	Varies significantly
Encouragement from Government	Annual Income	309.581	25	Varies significantly
Financial Reason and Food consumption	Education Level	299.157	18	Varies significantly
More Demand	Number of Children	256.511	18	Varies significantly

Source: Researcher's Analysis (2018).

4.6.3. District of Lagunes

Table 4.24 indicates the reasons for adoption of cassava among age groups in Lagunes district. Five hundred and ninty six (49.7%) respondents indicating they cultivated cassava due to financial reasons from which 142 (11.8%) respondents were less than 21 years. Among them, 136 (11.3%) were between (41-50) years, while the last were 35 (2.9%) above 60 years old. The second main reason was that it was the usual crop cultivated by the Ethnic group. This reason accounted for 242 (20.2%) respondents. Among the respondents, 127 (10.6%) were between (41-50) years and 2 (0.2%) were between (21-30) years. The last reason for adoption of cassava was due to the encouragement from the government and this accounted for 2 respondents (0.2%) with the age group (31-40). Reasons for adoption of cassava were cross tabulated among age groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.30 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly across Lagunes on the basis of age given that $X^2=399.117$; df =30, p=0.000.

Table 4.25 indicates the reasons for adoption of cassava between sex groups in Lagunes district. Five hundred and ninty-six (50%) respondents indicated their finances as the major reason for cultivating cassava in which there were 322 (27%) male respondents against 274 female. The second aim in this district was that it was the usual crop cultivated by ethnic group. This accounted for 242 (20.3%). Among them, 147 (12.3%) were female against 95 (8.0%) male. The last motive for adopting cassava was also encouragement from government. This reason was 2 (0.2%) with 2 (0.2%) male.

Reasons for cassava adoption were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.30 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly between sex groups across Lagunes on the basis that $X^2=34.852$; df =6, p=0.000.

Table 4.24. Reasons for the Adoption of Cassava among Age Groups in Lagunes District

Reasons for the Adoption of Cassava		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Financial Reasons	Count	142	92	110	136	81	35	596
	% of Total	11.8%	7.7%	9.2%	11.3%	6.8%	2.9%	49.7%
For Food and Consumption	Count	4	23	34	30	41	30	162
	% of Total	0.3%	1.9%	2.8%	2.5%	3.4%	2.5%	13.5%
Usual crop cultivated by Ethnic group	Count	0	2	52	127	61	0	242
	% of Total	0.0%	0.2%	4.3%	10.6%	5.1%	0.0%	20.2%
Encouragement from Government	Count	0	0	2	0	0	0	2
	% of Total	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Easy Cultivation	Count	0	0	7	9	0	0	16
	% of Total	0.0%	0.0%	0.6%	0.8%	0.0%	0.0%	1.3%
Financial Reason and to Feed	Count	7	43	44	38	32	3	167
	% of Total	0.6%	3.6%	3.7%	3.2%	2.7%	0.2%	13.9%
More Demand	Count	0	13	0	0	0	2	15
	% of Total	0.0%	1.1%	0.0%	0.0%	0.0%	0.2%	1.2%
Total	Count	153	173	249	340	215	70	1200
	% of Total	12.8%	14.4%	20.8%	28.3%	17.9%	5.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.25. Reasons for the Adoption of Cassava between Sex Groups in Lagunes District

Reasons for the Adoption of Cassava		Sex groups		Total
		Male	Female	
Financial Reasons	Count	322	274	596
	% of Total	27.0%	23.0%	50.0%
For Food and Consumption	Count	73	81	154
	% of Total	6.1%	6.8%	12.9%
Usual crop cultivated by Ethnic group	Count	95	147	242
	% of Total	8.0%	12.3%	20.3%
Encouragement from Government	Count	2	0	2
	% of Total	0.2%	0.0%	0.2%
Easy Cultivation	Count	0	16	16
	% of Total	0.0%	1.3%	1.3%
Financial Reason and to Feed	Count	85	83	168
	% of Total	7.1%	7.0%	14.1%
More Demand	Count	10	5	15
	% of Total	0.8%	0.4%	1.3%
Total	Count	587	606	1193
	% of Total	49.2%	50.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.26 indicates the reasons for adoption of cassava among marital status groups of respondents in Lagunes district. A total of 588 (49.6%) respondents claimed cassava cultivation was due to their financial reason from which there were 299 (25.2%) single against 236 (19.9%) married respondents. The second reason for adopting cassava was that it was the usual crop cultivated by ethnic group. This reason was accounted for 249 (20.4%). Among the respondents, 143 (12.1%) were married while, 23(1.9%) were divorced. The last basis for adopting cassava was encouragement from Government. This reason accounted for 2 (0.2%) with majority of the married respondents.

Reasons for adoption of cassava in Lagunes district were cross tabulated among marital status groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.30 indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly among marital status of respondents across Lagunes given that X^2=186.759; df =18, p=0.000.

Table 4.27 indicates the reasons for adoption of cassava among annual income groups in Lagunes district. Five hundred and eighty (49%) of respondents indicated that financial reason was the main reason for adopting cassava from which 200 (16.9%) respondents earns more than 200,000FCFA annually against 2 (0.2%) who earns between 161,000-180,000 FCFA. The second reason was that it was the usual crop cultivated by ethnic group. One hundred and twenty-six (10.7%) earning less than 121,000 FCFA. The last reason was encouragement from government. For this reason, the number of respondents was 2 (0.2%) and the income was between 121,000-140,000 F CFA. Reasons for adoption of cassava were cross tabulated among annual income groups of respondents to ascertain the significance of the variation. The result of the Chi square test in Table 4.30 indicates that at a given probability level of 0.05 and confidence level of 95%, that reasons for adoption of cassava varies significantly on the basis of annual income of respondents across Lagunes (X^2=525.926; df =30, p=0.000).

Table 4.26. Reasons for the Adoption of Cassava among Marital Status groups in Lagunes District

Reasons for the Adoption of Cassava		Marital Status				Total
		Married	Single	Divorced	Widowed	
Financial Reasons	Count	236	299	17	36	588
	% of Total	19.9%	25.2%	1.4%	3.0%	49.6%
For Food and Consumption	Count	72	53	10	19	154
	% of Total	6.1%	4.5%	0.8%	1.6%	13.0%
Usual crop cultivated by Ethnic group	Count	143	35	23	41	242
	% of Total	12.1%	3.0%	1.9%	3.5%	20.4%
Encouragement from Government	Count	2	0	0	0	2
	% of Total	0.2%	0.0%	0.0%	0.0%	0.2%
Easy Cultivation	Count	7	0	0	9	16
	% of Total	0.6%	0.0%	0.0%	0.8%	1.4%
Financial Reason and to Feed	Count	92	64	12	0	168
	% of Total	7.8%	5.4%	1.0%	0.0%	14.2%
More Demand	Count	5	10	0	0	15
	% of Total	0.4%	0.8%	0.0%	0.0%	1.3%
Total	Count	557	461	62	105	1185
	% of Total	47.0%	38.9%	5.2%	8.9%	100.0%

Source: Researcher's Analysis (2018).

Table 4.27. Reasons for the Adoption of Cassava among Annual Income Groups in Lagunes District

Reasons for the Adoption of Cassava		Annual Income from Cassava						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Financial Reasons	Count	128	47	19	2	184	200	580
	% of Total	10.8%	4.0%	1.6%	0.2%	15.6%	16.9%	49.0%
For Food and Consumption	Count	103	32	10	0	9	7	161
	% of Total	8.7%	2.7%	0.8%	0.0%	0.8%	0.6%	13.6%
Usual crop cultivated by Ethnic group	Count	126	93	9	12	1	1	242
	% of Total	10.7%	7.9%	0.8%	1.0%	0.1%	0.1%	20.5%
Encouragement from Government	Count	0	2	0	0	0	0	2
	% of Total	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.2%
Easy Cultivation	Count	16	0	0	0	0	0	16
	% of Total	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
Financial Reason and to Feed	Count	54	38	17	4	23	31	167
	% of Total	4.6%	3.2%	1.4%	0.3%	1.9%	2.6%	14.1%
More Demand	Count	10	0	0	3	2	0	15
	% of Total	0.8%	0.0%	0.0%	0.3%	0.2%	0.0%	1.3%
Total	Count	437	212	55	21	219	239	1183
	% of Total	36.9%	17.9%	4.6%	1.8%	18.5%	20.2%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.28 indicates the reasons for adoption of cassava among educational level groups in Lagunes district. Five hundred and eigty-seven (49.3%) respondents indicates that financial reason was the first reason for adoption of cassava from which 245 (20.6%) had primary education against 11 (0.9%) had tertiary education. The second reason was that it was the usual crop cultivated by ethnic group. This reason accounted for 242 (20.3%). 85 (7.1%) respondents with no formal education and 108 (9.1%) had primary education. The last reason was encouragement from Government with 2 (0.2%) without formal education. Reasons for adoption of cassava were cross tabulated among educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.30 indicates that at a given probability level of 0.05 and confidence level of 95%, that reasons for adoption of cassava varies significantly among the educational level of respondents across Lagunes (X^2=105.192; df =18, p=0.000).

Table 4.28. Reasons for the Adoption of Cassava among Education level Groups in Lagunes District

Reasons for the Adoption of Cassava		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Financial Reasons	Count	135	245	196	11	587
	% of Total	11.3%	20.6%	16.5%	0.9%	49.3%
For Food and Consumption	Count	85	45	31	1	162
	% of Total	7.1%	3.8%	2.6%	0.1%	13.6%
Usual crop cultivated by Ethnic group	Count	85	108	49	0	242
	% of Total	7.1%	9.1%	4.1%	0.0%	20.3%
Encouragement from Government	Count	2	0	0	0	2
	% of Total	0.2%	0.0%	0.0%	0.0%	0.2%
Easy Cultivation	Count	9	0	7	0	16
	% of Total	0.8%	0.0%	0.6%	0.0%	1.3%
Financial Reason and to Feed	Count	71	53	43	0	167
	% of Total	6.0%	4.5%	3.6%	0.0%	14.0%
More Demand	Count	0	5	10	0	15
	% of Total	0.0%	0.4%	0.8%	0.0%	1.3%
Total	Count	387	456	336	12	1191
	% of Total	32.5%	38.3%	28.2%	1.0%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.29 shows the reasons for adoption of cassava among number of children groups in the Lagunes district. The reasons for adopting cassava are presented in Table 6.34. Indeed, 595 (50.4%) respondents were of the opinion that their financial state was the major reason why they chose to cultivate cassava. One hundred and eigty five (15.7%) respondents claimed to have 3-5 children against 124 (10.5%) with above 5 children.

The second main reason in this district was that it was the usual crop cultivated by ethnic group. This reason accounted for 242 (20.5%). Among this reason, 92 (7.8%) had between 3-5 children. The next reason was for food consumption. This accounted 159 (13.5%) with 60 (5.1%) who had above 5 children against 31 (2.6%) for those without children. Finally, the last reason in this district was encouragement from Government with 2 (0.2%) of the respondents with less than 3 children. Reasons for adoption of cassava were cross tabulated among number of children groups of respondents in Lagunes district to ascertain the significance of the variation. The result of the Chi square test (Table 4.30) indicates that at a given probability level of 0.05 and confidence level of 95%, the reasons for adoption of cassava varies significantly on the basis of number of children of respondents across Lagunes (X^2=151.538; df =18, p=0.000).

Cassava in southeastern Côte d'Ivoire is characterized by the reasons that motivates this adoption. These rashes were cross-referenced with socio-economic characteristics to see if they influence cassava adoption or not.

This research observation is similar to Shakanye's (2017). In fact, using the logit model made it possible to determine the factors that influence the adoption of cassava. Results show cuttings accessibility, association membership, yield, crop cycle, farming experience, root size, taste, storage life, disease and pest resistance the cropping system and income are the ones that influence the adoption of cassava.

From this study the income also appears in our study. However, the reasons listed in this study also contribute to the adoption of cassava.

Table 4.29. Reasons for the Adoption of Cassava among Number of Children Groups in Lagunes District

Reasons for the Adoption of Cassava		Number of Children				Total
		None	Less than 3	3 - 5	Above 5	
Financial Reasons	Count	151	135	185	124	595
	% of Total	12.8%	11.4%	15.7%	10.5%	50.4%
For Food and Consumption	Count	31	34	34	60	159
	% of Total	2.6%	2.9%	2.9%	5.1%	13.5%
Usual crop cultivated by Ethnic group	Count	23	56	92	71	242
	% of Total	1.9%	4.7%	7.8%	6.0%	20.5%
Encouragement from Government	Count	0	2	0	0	2
	% of Total	0.0%	0.2%	0.0%	0.0%	0.2%
Easy Cultivation	Count	0	16	0	0	16
	% of Total	0.0%	1.4%	0.0%	0.0%	1.4%
Financial Reason and to Feed	Count	15	41	30	66	152
	% of Total	1.3%	3.5%	2.5%	5.6%	12.9%
More Demand	Count	0	10	5	0	15
	% of Total	0.0%	0.8%	0.4%	0.0%	1.3%
Total	Count	220	294	346	321	1181
	% of Total	18.6%	24.9%	29.3%	27.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.30. Chi-square Result of Variation of Reasons of Adoption of Cassava in District of Lagunes.

Reasons of adoption of cassava	District of Lagunes			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Financial Reasons	Age	399.117	30	Varies significantly
For Food and Consumption	Sex	34.117	6	Varies significantly
Cultivated by Ethnic group	Marital status	186.759	18	Varies significantly
Encouragement from Government	Annual Income	525.926	30	Varies significantly
Financial Reason and Food consumption	Education Level	105.192	18	Varies significantly
More Demand	Number of Children	151.538	18	Varies significantly

Source: Researcher's Analysis (2018).

This section examined reason for adoption of cassava in south-eastern Côte d'Ivoire. The socio-economic and demographic characteristics of respondents, showing the proportion and categories into which respondents belong in terms the selected socio-economic and demographic characteristics, these are; age, sex, annual income from cassava, number of children, educational status and, the marital status of respondents. Furthermore, the variation between the determinants of cassava adoption and the socio-economic showed a significant variation between the determinants of cassava adoption and the socio-economics characteristics of respondents. The research results are identical to those of Ojuekaiye (2001) and Kouakou (2014). Indeed, in the latter author shows the relationship between the reasons in the production of food crops in general, and cassava in particular, that financial returns are the most determining elements in the adoption of a crop in the rural world. However, he does not explain, as in this thesis, the impact of each characteristic socio-economic factor in adoption. Nevertheless, the following authors, Mbuyamba (2011), Mpagalile et al, (2006). Idrisa et al, (2008), for their part, put these elements into account in the adoption of a culture. It is important to remember that each element is essential in the adoption of cassava in the south-east of Côte d'Ivoire because they constitute the labour force and explain the productivity or sufficient production because (Age, Income, Education, and Number of Children) are the most useful elements in the adoption of cassava. Impediments to adoption and cultivation of cassava

About the problems of adoption and cultivation of cassava, it should be explained that within the association of cassava growers, there are two types of problems at the level of adoption on the one hand, and at the level of cassava cultivation on the other hand. Indeed, not all cassava growers who have adopted the crop produce on the same scale. For this reason, we decided to highlight the problems of adoption and cassava cultivation.

4.7. Variation of impediments to adoption and cultivation of cassava

4.7.1. Variation of impediments to adoption of cassava

The variation in the impediments to cassava adoption by respondents was examined across the study. Figure 4.22 shows the challenges to the of adoption of cassava in south-eastern Côte d'Ivoire. The problems encountered were the same in the study area. However, at different scales, these problems are mentioned. As an example, the problem of inadequate rainfall in the districts. However, the Lacs district knows this problem on a crucial scale compared to the other two districts (Figure 4.22).

The problems that farmers face in adopting cassava are inadequate rainfall,lack of accessing stems, lack of capital and lack of man power. Moreover, it is clear from the observation that the problem is inadequate rainfall in the region. Indeed cassava is not very much demanding in water but in need of the climatic conditions with an abundant rain which facilitated the growth of the plant according to Hédin (2016).

According to Hédin (2016), climate and soil are closely linked in the adoption of cassava. An average of 1000 to 1500 mm of rain is required for good average soil permeability that can facilitate the adoption of cassava cultivation.

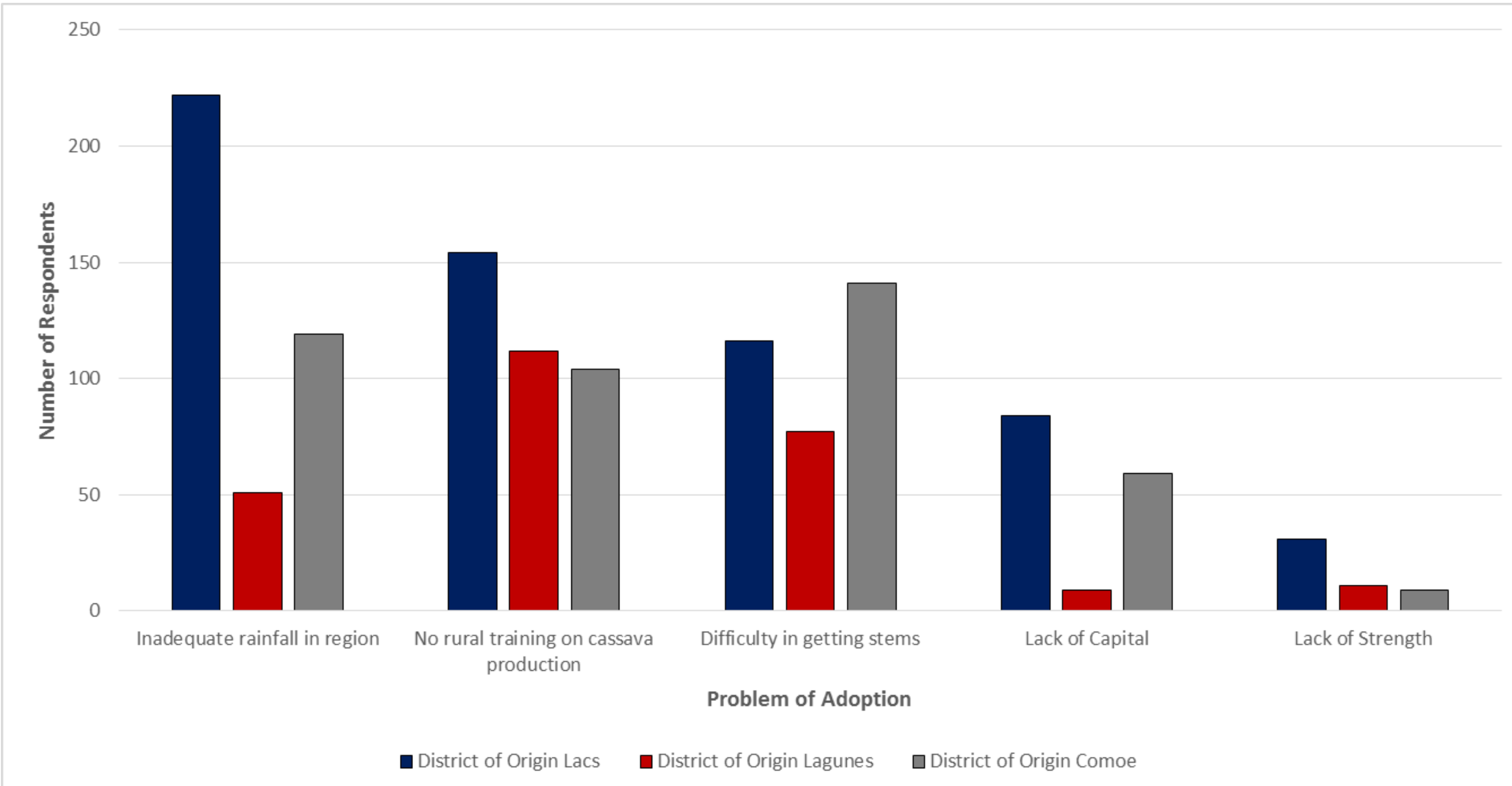

Figure 4.22 **Impediments to cassava adoption across the Study Area (154 Villages).**

Source: Researcher's Analysis (2018).

There is a constant level of problems encountered. Indeed, the problems encountered in the adoption of cassava in the study area are the same. However, they are at varying levels at the district level. To verify this information, the result of the One-way analysis of variance (Table 4.31) was used. The statistical test was carried out at a given probability level of 0.05 and confidence level of 95%. The Impediments to adoption of cassava did not vary significantly across the districts (Sig. = 0.182). Thus, it can be infer that this may be due to the clustering of the choice of respondents around a particular impediment across the three districts that constitute the study area. Furthermore, another possible reason might be the number of respondents that stated that they encounter impediments in adopting cassava.

Table 4.31. Variation of Impediments to Cassava Adoption across the Study

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
If Yes, what problems did you face in adopting cassava?	Between Groups	4.385	2	2.193	1.706	.182
	Within Groups	1666.058	1296	1.286		
	Total	1670.443	1298			

Source: Researcher's Analysis (2018).

4.7.1.1. Variation of Impediments to Cultivation of Cassava

The variation of the impediments to cultivation of cassava by respondents was examined across the study area using the district as the unit of analysis. Figure 4.23 indicates the problems encountered in cultivation of cassava in the studied districts.

There are problems associated with the cultivation of cassava. These problems include inadequate rainfall, lack of fertilizer, pest and rodents, high price of getting cassava stems, insufficient manpower, poor soil fertility, insufficient capital, lack of arable land, difficulty in getting cassava stems, no equipment/machinery to process, transportation and fluctuating price of cassava. Based on the observation, in the districts studied, we encountered the same problems slowing the cassava crop. The most important problem in cultivation of cassava is the fluctuation in price of cassava. This problem is serious in the district of Comoé. Indeed, more than 700 inquiries complain about this situation in this district, followed by the district of Lacs with 400 inquiries and finally the district of Lagunes.

The second problem of cultivation of cassava was, pests and rodents. Indeed, in the district of Lacs this situation is very important. The respondents of almost 300 complained about this problem while, the same problem is almost equal to the other district with a litle high respondent number in the district of Comoé. The third problem was no equipment to process. According to FAO (2012), the question of the condition of cassava is of paramount importance. Cassava is a perishable food crop as a whole and so it is right that people should develop cassava storing and conservation techniques with government support.

Speaking of method of cassava conservation, Kouame (2015) develops the conservation technique over a period of about two months of cassava. This technique involves burying the cassava in the ground and watering it every two days. It makes it possible to regulate the stagnation of its production and reaches even weakly to maintain the food availability at the local scale. Finally, the last problem in the cultivation of cassava that respondents encounter is lack of fertilizer. This problem is only visible in the Lacs district. On the other hand, it is totally non-existent in the other districts.

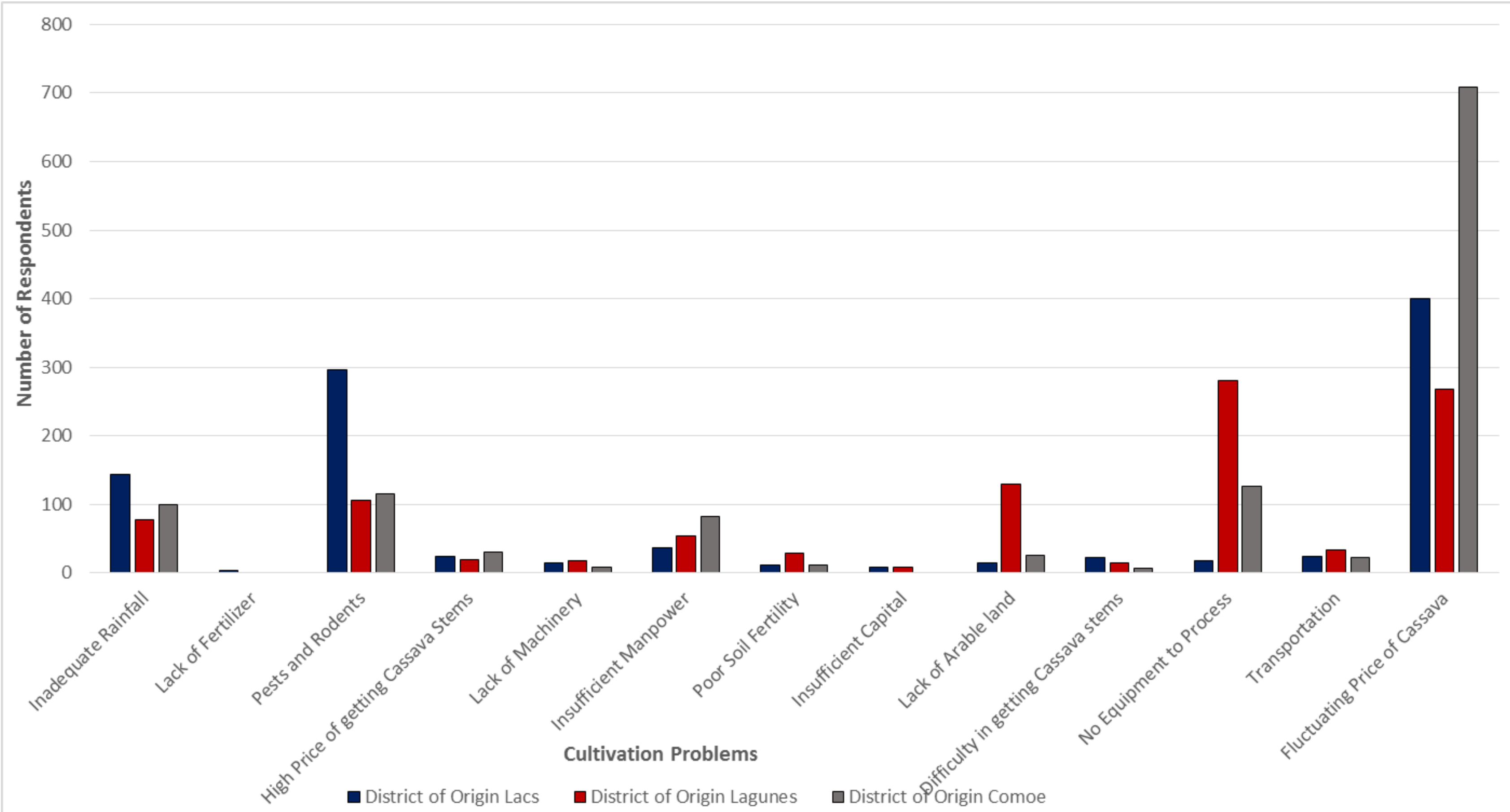

Figure 4.23. Impediments to cassava cultivation across the Study Area (154 Villages).

Source: Researcher’s Analysis (2018).

Table 4.32 shows the result of the One-Way analysis of variance. The statistical test was also carried out at a given probability level of 0.05 and confidence level of 95%. The impediments to cultivation of cassava varies significantly across the districts (F= 90.419, Sig. = 0.000). Thus, one can infer that this may be due to the spread of the choice of respondents of a particular impediment across the three districts that constitute the study area. Furthermore, another possible reason might be that a higher proportion of the study population stated that they encounter impediments during the process of cultivating cassava.

Table 4.32 Variation of Impediments to Cassava Cultivation across the Study Area

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
If yes, what problem do you face in cultivation?	Between Groups	3553.497	2	1776.749	90.419	.000
	Within Groups	64648.976	3290	19.650		
	Total	68202.473	3292			

Source: Researcher's Analysis (2018).

4.7.2. Variation of impediments to adoption among Socio-economic Characteristics

Table 4.33 indicates the variation of impediments to adoption of cassava among age groups. The first problem to adoption of cassava as the respondents response was inadequate rainfall in region. Out of the total 1,298 respondents, 392 (30.2%) reported the problem of inadequate rainfall. The majority age groups was 31-40 (30.7%), following by the age group 41-50 which accounted for (25.5%). The second problem in the adoption of cassava is lack of training on cassava production. This problem represents (28.4%) from 369 respondents. In this category, the majority age group 51-60 (47.4%). They are followed by the age group of 41-50 (28.01%). The third is difficulty in getting stems. The age group most affected by this problem is that between 31-40 years old and represents (33.04%) followed by those having 41-50. As for the problem of lack of strength, this problem is the last problem in the adoption of cassava. The age group affected by this problem is 41-50 (6.02%). The least affected by this problem are those aged under 21 and those who fall under the 31-40 age group. They represent (1.7%) and (0.28%).The age group which accounts for the largest portion of the respondents that face impediments to adoption of cassava is between 31 and 40 years old. Following this is the age group of 41 and 50 years. Furthermore, the age group 51 and 60years' account for 19.2%, the age group of 21 and 30 years' account for 16.7% of these set of respondents, 11.4% represents the portion of respondents who were above 60years old, while 4.4% accounts for respondents that were less than 21years old.

A possible reason for this is that in the rural area, most of the farmers within this age bracket (31 and 40 and 41 and 50) were born close to the inception of cassava cultivation in the study area as reported by the respondents and already understood the basics and rudiments of the crop hence the farmers have a lot of experience in cassava cultivation and consequently the children are also incorporated into the development of farms.

Table 4.33. Impediments to the Adoption of Cassava Among Age Groups

Impediments for adoption		Age groups						Aggregate
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Inadequate rainfall in region	Number	37	60	106	72	67	50	392
	Percentage	64.9%	27.6%	30.7%	25.5%	26.9%	33.8%	30.2%
No rural training on cassava production	Number	16	44	75	79	118	37	369
	Percentage	28%	20.3%	21.7%	28.01%	47.4%	25%	28.4%
Difficulty in getting stems	Number	2	58	114	98	47	15	334
	Percentage	3.5%	26.7%	33.04%	34.7%	18.9%	10.13%	25.7%
Lack of Capital	Number	1	44	49	16	11	31	152
	Percentage	1.7%	20.2%	14.2%	5.7%	4.41%	20.9%	11.7%
Lack of Strength	Number	1	11	1	17	6	15	51
	Percentage	1.7%	5.07%	0.28%	6.02%	2.4%	10.13%	3.9%
Total	Number	57	217	345	282	249	148	1298
	Percentage	100%	100%	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.39 shows the variation of impediments to adoption of cassava among age groups of respondents. This was tested using the Pearson's Chi-square test of relationship. These impediments were first cross-tabulated with the age groups of respondents in order to ascertain the significance of variation. At a set significance level of 0.05 and a confidence interval of 95%, the Chi-square test revealed that impediments to adoption of cassava varies significantly among age groups of respondents with (Chi Square= 198.354, Sig. =.000).

Table 4.34 indicates the variation to impediments to cultivation of cassava bewteen sex groups. There are more women who cultivate cassava than men. Out of the total respondents (4000 farmers) only 1275 reported their gender with respect to the impediments to adoption of cassava. Inadequate rainfall is the first impediments to adoption of cassava. This accounted for 375 respondents (29.4%) with 203 males (33.2%) against 172 (25.9%) females. One hundred and sixty-three male respondents and 207 female respondents stated that there was no rural training on cassava production, accounting for 29.0% of the total. One hundred and thirty-sixty male respondents and 198 female respondents stated they faced difficulty in getting cassava stems, accounting for 26.2% of the total. A total of 84 male respondents and 61 female respondents stated that they lack capital, accounting for 11.4% of the total; while 25 male respondents and 26 female respondents stated that they lack the strength to cultivate cassava, accounting for 4.0% of the total.

Furthermore, adoption of cassava is attributed to women because it is easier to produce and process according to the respondents. In addition, acquiring a parcel of land to cultivate cassava is also easy as opposed to the cultivation of cassava for export which is mostly for men, cassava production is to help them support their family by selling it as an export crop. Understanding gender distribution with respect to impediments to cassava adoption is very important because it reveals the capacity of each respective gender who work on the farm to ensure productivity and efficiency.

Table 4.34. Impediments to Adoption of Cassava between Sex Groups

Impediments for adoption		Sex groups		Aggregate
		Male	Female	
Inadequate rainfall in region	Number	203	172	375
	Percentage	33.2%	25.9%	29.4%
No rural training on cassava production	Number	163	207	370
	Percentage	26.7%	31.1%	29.0%
Difficulty in getting stems	Number	136	198	334
	Percentage	22.2%	29.8%	26.2%
Lack of Capital	Number	84	61	145
	Percentage	13.7%	9.1%	11.4%
Lack of Strength	Number	25	26	51
	Percentage	4.09%	3.9%	4.0%
Total	Number	611	664	1275
	Percentage	100%	100%	100.0%

Source: Researcher's Analysis (2018).

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Table 4.39 indicates variation of impediments to adoption of cassava between sex groups of respondents. This was tested using the Pearson's chi-square test of a relationship. These impediments were cross-tabulated with the sex groups of respondents in order to ascertain the significance of the variation.

At a set significance level of 0.05, and a confidence interval of 95%, there is a relationship (Chi Square= 20.805, Sig. =.000), the impediments to adoption of cassava varies significantly between sex of respondents.

Table 4.35 shows the impediments to adoption of cassava and the marital status of respondents. There are more married respondents who experienced impediments while adopting cassava. Out of the total count of respondents (4,000 farmers) only 1,262 stated their marital status. A combination of both inadequate rainfalls in the region and no rural training on cassava production accounted for the largest section in this category. This accounted for 31.1% (392 respondents) which were married and 29.3% (370 respondents) were single, out of the 1,262 respondents considered in this section.

Despite the inadequate rainfall in the region and no rural training on cassava production, the other impediments are equally important. Among the others impediments; difficulty in getting stems, lack of capital, and lack of strength accounted for 25.4% (33 respondents), 10.9% (27 respondents), and 3.3% (24 respondents) respectively.

Table 4.39 indicates the variation of impediments to adoption among marital status groups of respondents. This was tested using the Pearson's Chi-square test of a relationship. The impediments were cross-tabulated with the marital status of respondents in order to ascertain the significance of the variation.

At a set significance level of 0.05, and a confidence interval of 95%, that there is a significant variation (Chi Square= 86.188, Sig. =.000), among the impediments to adoption and marital status of respondents.

Table 4.35. Impediments to Adoption of Cassava among Marital Status Groups

Impediments for adoption		Marital Status groups				Aggregate
		Married	Single	Divorced	Widowed	
Inadequate rainfall in region	Number	265	79	27	21	392
	Percentage	34.7%	20.4%	45%	42%	31.1%
No rural training on cassava production	Number	226	127	13	4	370
	Percentage	29.6%	32.7%	21.7%	8%	29.3%
Difficulty in getting stems	Number	184	115	11	10	320
	Percentage	24.08%	29.6%	18.3%	20%	25.4%
Lack of Capital	Number	65	58	1	14	138
	Percentage	8.5%	14.9%	1.7%	28%	10.9%
Lack of Strength	Number	24	9	8	1	42
	Percentage	3.14%	2.3%	13.3%	2%	3.3%
Total	Number	764	388	60	50	1262
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.36 indicates the impediments to adoption of cassava among annual income. Out of the total number of respondents of 4,000, only 1,183 respondents stated the average amount they earn from cassava annually. They also hinted that they encounter impediments to adoption. A combination of inadequate rainfalls in the region and no rural training on cassava production accounted for the largest section in this category accounting for 30.9% (362 respondents) and 30.6% (362 respondents) of the 1,262 respondents considered in this section. Those involved these impediments earn less than 120,000 FCFA, follow by 121,000-140,000 FCFA and 141,000 to 160,000 FCFA.

In addition to inadequate rainfall in the region and no rural training on cassava production, the other impediments are equally important. Among the other impediments; difficulty in getting stems, lack of capital and lack of strength account for 26.5% (313 respondents), 7.9% (93 respondents), and 4.2% (50 respondents) respectively.

Table 4.39 shows the Pearson's Chi square test of relationship. These impediments were cross-tabulated with income groups of respondents in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, there is a significant variation (Chi Square= 285.508, Sig. =.000), among the impediments to adoption of cassava and annual income of respondents.

Tables 4.37 indicates the impediments they might have experienced in the adoption of cassava among educational level. Out of the total respondents of 4,000, only 1,269 respondents who stated their educational level, also stated that they encounter impediments to adoption of cassava. A combination of both inadequate rainfalls in the region and no rural training on cassava production as impediments accounted for the largest section in this category accounting for 30.3% (384 respondents) and 28.5% (362 respondents) of the 1,262 respondents considered in this section with respectively no formal education and primary education. In addition, the other impediments are equally important.

Table 4.36. Impediments to Adoption of Cassava among Income from Cassava Groups

Impediments for adoption		Annual Income from Cassava groups						Aggregate
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate rainfall in region	Number	206	67	2	39	19	32	365
	Percentage	37.1%	29.8%	2.1%	48.1%	16.9%	28.1%	30.9%
No rural training on cassava production	Number	106	39	75	15	66	61	362
	Percentage	19.1%	17.3%	78.1%	18.5%	58.9%	53.5%	30.6%
Difficulty in getting stems	Number	169	83	10	16	18	17	313
	Percentage	30.4%	36.9%	10.4%	19.7%	16%	14.9%	26.5%
Lack of Capital	Number	49	30	9	2	1	2	93
	Percentage	8.2%	13.3%	9.4%	2.5%	0.9%	1.7%	7.9%
Lack of Strength	Number	25	6	0	9	8	2	50
	Percentage	4.5%	2.6%	0.0%	11.1%	7.1%	1.7%	4.2%
	Number	555	225	96	81	112	114	1183
	Percentage	100%	100%	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.37. Impediments to Adoption of Cassava among Education Level Groups

Impediments for adoption		Education level groups				Aggregate
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate rainfall in region	Number	147	112	66	59	384
	Percentage	34.7%	25.1%	28.9%	34.1%	30.3%
No rural training on cassava production	Number	124	125	73	40	362
	Percentage	29.3%	28%	32%	23.1%	28.5%
Difficulty in getting stems	Number	106	124	59	45	334
	Percentage	25.05%	27.9%	25.9%	26.01%	26.3%
Lack of Capital	Number	29	68	13	28	138
	Percentage	6.8%	15.3%	5.7%	16.1%	10.9%
Lack of Strength	Number	17	16	17	1	51
	Percentage	4%	3.6%	7.4%	0.57%	4.0%
Total	Number	423	445	228	173	1269
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher’s Analysis (2018).

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Table 4.39 shows the Pearson's Chi square test of relationship.These impediments were cross-tabulated with educational level of respondents in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, there is a significant variation (Chi Square= 47.479, Sig. =.000), among the impediments to adoption of cassava and educational status of respondents.

Table 4.38 indicates the impediments to adoption of cassava among number of children groups. The number of children as reported by the respondents ranges from 0 to above 5 children. Out of the total respondents of 4,000, only 1,270 respondents stated the number of children. A combination of both inadequate rainfalls in the region and no rural training on cassava production accounted for the largest section in this category. It accounts for 30.9% (392 respondents) and 29.1% (370 respondents) of the 1262 respondents considered in this section. Among the major impediments, the respondents with less than 3 and above 5 children are the majority, followed by those who have between 3-5 children. In addition to inadequate rainfall in the region and no rural training on cassava production, the other impediments are equally important. Among the other impediments; difficulty in getting stems, lack of capital, and lack of strength account for 25.7% (327 respondents), 10.3% (131 respondents), and 3.9% (50 respondents) respectively.

The impediments to adoption of cassava among number of children groups of respondents was tested using the Pearson's Chi square test of relationship. These impediments were cross-tabulated with the number of children of respondents (Table 4.39) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, that there is a significant variation (Chi Square= 57.308, Sig. =.000), among the impediments and number of children of respondents.

Table 4.38. Impediments to Adoption of Cassava among Number of Children Groups

Impediments for adoption		Number of Children groups				Aggregate
		None	Less than 3	3 - 5	Above 5	
Inadequate rainfall in region	Number	32	130	111	119	392
	Percentage	29.9%	33.2%	34.1%	26.7%	30.9%
No rural training on cassava production	Number	41	76	98	155	370
	Percentage	38.3%	19.4%	30.1%	34.7%	29.1%
Difficulty in getting stems	Number	18	131	77	101	327
	Percentage	16.8%	33.4%	23.7%	22.6%	25.7%
Lack of Capital	Number	15	47	27	42	131
	Percentage	14%	12%	8.3%	9.4%	10.3%
Lack of Strength	Number	1	8	12	29	50
	Percentage	0.9%	2.04%	3.7%	6.5%	3.9%
Total	Number	107	392	325	446	1270
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.39. Chi-square Result of variation of impediments to adoption of cassava among socio-economic across characteristics

Impedimennts to adotiopn of cassava	Result across the districts			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate rainfall in region	Age	198.354	20	Varies significantly
No rural training on cassava production	Sex	20.805	4	Varies significantly
	Marital status	86.188	12	Varies significantly
Difficulty in getting stems	Annual Income	285.508	20	Varies significantly
Lack of Capital				
Lack of Strength	Education Level	47.479	12	Varies significantly
	Number of Children	57.308	12	Varies significantly

Source: Researcher's Analysis (2018).

4.7.3. Variation of impediments to adoption of cassava across each Districts

4.7.3.1. Variation of impediments to adoption of cassava in Comoé district

Table 4.40 shows the variation of impediments to adoption of cassava among age groups. One hundred and forty-four (32.6%) respondents indicated that difficulty in getting stems was the major impediment to adoption of cassava. The majority age group was 31-40 with 12.2% followed by 41-50 with 11.5%.

The second major impediments to cultivation of cassava in Comoé district was, inadequate rainfall. This accounted for 123 (27.8%) with the majority age group 21-30 (10.4%). Only 9 (0.2%) respondents were of the opinion that the lack of strength was an impediment; 46 (10.4%) respondents within the age group 21-30 indicated inadequate rainfall in the region; 22 (5%) respondents within the age group 31-40 and 41-50 respectively were of the opinion that there were no rural training on cassava production, within the age group > 60; 22 (5%) respondents confirmed the lack of capital as an impediment to adoption of cassava.

Impediments to adoption of cassava in Comoé district were cross tabulated between age of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates that at a given probability level of 0.05 and confidence level of 95%, the impediments to adoption of cassava varies significantly across Comoé on the basis of age given that X^2=275.503; df =20, p=0.000.

Table 4.41 shows the variation of the impediments to adoption of cassava bewteen sex groups across Comoé district. 144 (33.1%) respondents indicated that the major impediment in adopting cassava was the difficulty of getting stems. Among them, the majority age groups was the male with 16.3% against female 13.6%.

Eighty-five (19.5%) males indicated the inadequate rainfall in the region; 59 (13.6%) females confirmed there were no rural training on cassava production while 38 (8.7%) males were of the opinion that lack of capital was the problem faced in adopting cassava and only 9 (2.1%) respondents revealed that the lack of strength was an impediments in adopting cassava. Impediments to adoption of cassava were cross tabulated between sex of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation between impediments to adoption of cassava and sex of respondents across Comoe given that $X^2=33.641$; df $=4$, $p=0.000$.

Table 4.40 . Impediments to Adoption of Cassava among Age Groups in Comoé District

Impediments to Adoption		Age groups						Total
		<21	**21 - 30**	**31 - 40**	**41 - 50**	**51 – 60**	**>60**	
Inadequate rainfall in region	Count	17	46	37	15	8	0	123
	% of Total	3.8%	10.4%	8.4%	3.4%	1.8%	0.0%	27.8%
No rural training on cassava production	Count	0	19	22	22	41	2	106
	% of Total	0.0%	4.3%	5.0%	5.0%	9.3%	0.5%	24.0%
Difficulty in getting stems	Count	0	25	54	51	0	14	144
	% of Total	0.0%	5.7%	12.2%	11.5%	0.0%	3.2%	32.6%
Lack of Capital	Count	0	19	12	7	0	22	60
	% of Total	0.0%	4.3%	2.7%	1.6%	0.0%	5.0%	13.6%
Lack of Strength	Count	0	0	0	8	0	1	9
	% of Total	0.0%	0.0%	0.0%	1.8%	0.0%	0.2%	2.0%
Total	Count	17	109	125	103	49	39	442
	% of Total	3.8%	24.7%	28.3%	23.3%	11.1%	8.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.41. Impediments to Adoption of Cassava between Sex Groups in Comoé District

Impediments to Adoption		Sex groups		Total
		Male	Female	
Inadequate rainfall in region	Count	85	38	123
	% of Total	19.5%	8.7%	28.3%
No rural training on cassava production	Count	47	59	106
	% of Total	10.8%	13.6%	24.4%
Difficulty in getting stems	Count	71	73	144
	% of Total	16.3%	16.8%	33.1%
Lack of Capital	Count	38	15	53
	% of Total	8.7%	3.4%	12.2%
Lack of Strength	Count	0	9	9
	% of Total	0.0%	2.1%	2.1%
Total	Count	241	194	435
	% of Total	55.4%	44.6%	100.0%

Source: Researcher's Analysis (2018).

Table 4.42 shows the impediments to adoption of cassava among marital status groups in Comoé district. Difficulty in getting stems was the major problem faced in adopting cassava as revealed by 137 (32.1%) respondents. The majority marital status was married with (24.4%). Inadequate rainfall in the region was an impediment for 105 (24.6%) married respondents, while 72 (16.9%) of the married respondents disclosed that there was no rural training on cassava production. Among the singles, 23 (5.4%) respondents indicated the lack of capital was a problem faced in cassava adoption.

Impediments to adoption of cassava were cross tabulated among marital status of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among marital status of respondents across Comoé given that X^2=141.447; df =12, p=0.000.

Table 4.43 shows the impediments to adoption of cassava among annual income groups. One hundred and thirty (32.1%) respondents indicated the difficulty in getting stems was the major problem faced in cassava adoption; 78 (19.3%) respondents earning less than 121,000 FCFA disclosed inadequate rainfall in the region was an impediment to cassava adoption while lack of rural training on adopting cassava was an impediment for 27 (19.3%) respondents with an annual income of less than 121,000FCFA; 8 (2%) respondents earning 161,000- 180,000 FCFA indicated the lack of strength to be an impediment to cassava adoption.

Impediments to cassava adoption were cross tabulated with annual income groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates that at a given probability level of 0.05 and confidence level of 95%, impediments to cassava adoption significantly varies across Comoé on the basis of annual income given that X^2=264.405; df =20, p=0.000.

Table 4.42. Impediments to Adoption of Cassava among Marital Status Groups in Comoé District

Impediments to Adoption		Marital status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate rainfall in region	Count	105	15	3	0	123
	% of Total	24.6%	3.5%	0.7%	0.0%	28.8%
No rural training on cassava production	Count	72	26	8	0	106
	% of Total	16.9%	6.1%	1.9%	0.0%	24.8%
Difficulty in getting stems	Count	104	24	9	0	137
	% of Total	24.4%	5.6%	2.1%	0.0%	32.1%
Lack of Capital	Count	22	23	1	14	60
	% of Total	5.2%	5.4%	0.2%	3.3%	14.1%
Lack of Strength	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	0.2%	0.2%
Total	Count	303	88	21	15	427
	% of Total	71.0%	20.6%	4.9%	3.5%	100.0%

Source: Researcher's Analysis (2018).

Table 4.43. Impediments to Adoption of Cassava among Annual Income Groups

Impediments to Adoption		Annual Income from Cassava						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate rainfall in region	Count	78	21	0	7	0	17	123
	% of Total	19.3%	5.2%	0.0%	1.7%	0.0%	4.2%	30.4%
No rural training on cassava production	Count	27	23	7	8	24	16	105
	% of Total	6.7%	5.7%	1.7%	2.0%	5.9%	4.0%	25.9%
Difficulty in getting stems	Count	82	40	0	7	1	0	130
	% of Total	20.2%	9.9%	0.0%	1.7%	0.2%	0.0%	32.1%
Lack of Capital	Count	16	15	8	0	0	0	39
	% of Total	4.0%	3.7%	2.0%	0.0%	0.0%	0.0%	9.6%
Lack of Strength	Count	0	0	0	8	0	0	8
	% of Total	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	2.0%
Total	Count	203	99	15	30	25	33	405
	% of Total	50.1%	24.4%	3.7%	7.4%	6.2%	8.1%	100.0%

in Comoé District

Source: Researcher's Analysis (2018).

Table 4.44 indicates the impediments to adoption of cassava among education level groups in Comoé district. The majority of the respondents of 144 (33.6%) indicated that difficulty in getting cassava stems was the problem faced in cassava adoption; most of them are primary education level. Inadequate rainfall in the region was the problem faced among respondents with primary education (12.9%) while 39 (9.1%) respondents with secondary education disclosed lack of rural training on cassava production was the major impediments on cassava adoption and 54 (12.6%) respondents with no formal education indicated the difficulty of getting cassava stem to be an impediment.

Impediments to adoption of cassava were cross tabulated with educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates that at a given probability level of 0.05 and confidence level of 95%, impediments to adoption of cassava varies significantly on the basis of education of respondents across Comoé (X^2=137.748; df =12, p=0.000).

The result presented in Table 4.45 indicates that difficulty in getting cassava stems was the major problem faced in cassava adoption as disclosed by 137 (32.6%) respondents, while 72 (17.1%) respondents with less than 3 children indicated inadequate rainfall in the region to be the major impediment. Also, 43 (10.2%) respondents with 3-5 children were of the opinion that the lack of rural training on cassava production was the problem faced in cassava adoption and 77 (18.3%) respondents with less than 3 children affirmed the difficulty of getting stem to be an impediment to the adoption of cassava.

Impediments to cassava adoption were cross tabulated with number of children groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.46 indicates at a given probability level of 0.05 and confidence level of 95%, that problems faced in adoption of cassava varies significantly by the number of children of respondents across Comoé (X^2=76.594; df =12, p=0.000).

Table 4.44. Impediments to Adoption of Cassava among Education level Groups in Comoé District

Impediments to Adoption		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate rainfall in region	Count	38	55	15	8	116
	% of Total	8.9%	12.9%	3.5%	1.9%	27.1%
No rural training on cassava production	Count	20	39	38	2	99
	% of Total	4.7%	9.1%	8.9%	0.5%	23.1%
Difficulty in getting stems	Count	54	76	0	14	144
	% of Total	12.6%	17.8%	0.0%	3.3%	33.6%
Lack of Capital	Count	0	36	10	14	60
	% of Total	0.0%	8.4%	2.3%	3.3%	14.0%
Lack of Strength	Count	0	0	8	1	9
	% of Total	0.0%	0.0%	1.9%	0.2%	2.1%
Total	Count	112	206	71	39	428
	% of Total	26.2%	48.1%	16.6%	9.1%	100.0%

Source: Researcher's Analysis (2018).

Table 4.45. Impediments to Adoption of Cassava among Number of Children Groups in Comoé District

Impediments to Adoption		Number of Children groups				Total
		None	Less than 3	3 – 5	Above 5	
Inadequate rainfall in region	Count	8	72	31	12	123
	% of Total	1.9%	17.1%	7.4%	2.9%	29.3%
No rural training on cassava production	Count	1	27	43	35	106
	% of Total	0.2%	6.4%	10.2%	8.3%	25.2%
Difficulty in getting stems	Count	0	77	36	24	137
	% of Total	0.0%	18.3%	8.6%	5.7%	32.6%
Lack of Capital	Count	0	17	13	16	46
	% of Total	0.0%	4.0%	3.1%	3.8%	11.0%
Lack of Strength	Count	0	0	8	0	8
	% of Total	0.0%	0.0%	1.9%	0.0%	1.9%
Total	Count	9	193	131	87	420
	% of Total	2.1%	46.0%	31.2%	20.7%	100.0%

Source: Researcher's Analysis (2018).

Table 4.46. Chi-square Result of impediments to Adoption of Cassava in District of Comoé.

Impediments to adoption of cassava	**District of Comoé**			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate rainfall in region No rural training on cassava production Difficulty in getting stems Lack of Capital Lack of Strength	Age	275.503	20	Varies significantly
	Sex	33.641	4	Varies significantly
	Marital status	141.447	12	Varies significantly
	Annual Income	264.405	20	Varies significantly
	Education Level	137.748	12	Varies significantly
	Number of Children	76.594	12	Varies significantly

Source: Researcher’s Analysis (2018).

4.7.3.2. Variation of Impediments to Adoption of Cassava in Lacs district

Table 4.47 presents the problems faced in cassava adoption among age groups. It reveals 222 (36.6%) respondents indicating inadequate rainfall in the region to be the major problem faced of which 61 (10.1%) respondents are aged 31-40; 53 (8.7%) respondents aged 51-60 disclosed the lack of rural training on cassava production as an impediment; 12 (2%) respondents aged >60 affirmed the lack of strength as problem faced in cassava cultivation.

Impediments to cassava adoption were cross tabulated with age groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to adoption of cassava varies significantly across Lacs on the account of age given that $X^2=151.056$; df =20, p=0.000.

The result presented in the table 4.48 reveals the variation of imepdiments to adoption bewteen sex groups in Lacs district. Two hundred and five (34.7%) respondents indicated the inadequate rainfall in the region as the major problem faced in adopting cassava, of which 118 (20%) are females; 78 (13.2%) female respondents disclosed that difficulty in getting stems was an impediment and 23 male respondents confirmed the lack of strength to be the problem faced in cassava adoption.

Impediments to cassava adoption were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, the problems faced in adoption of cassava varies significantly by the sex of respondents across Lacs ($X^2=17.710$; df =4, p=0.001).

Table 4.47. Impediments to Adoption of Cassava among Age Groups in Lacs District

Impediments to Adoption		Age groups						Total
		<21	21 - 30	31 - 40	41 – 50	51 - 60	>60	
Inadequate rainfall in region	Count	12	7	61	46	47	49	222
	% of Total	2.0%	1.2%	10.1%	7.6%	7.8%	8.1%	36.6%
No rural training on cassava production	Count	7	5	33	29	53	26	153
	% of Total	1.2%	0.8%	5.4%	4.8%	8.7%	4.3%	25.2%
Difficulty in getting stems	Count	0	28	28	24	35	1	116
	% of Total	0.0%	4.6%	4.6%	4.0%	5.8%	0.2%	19.1%
Lack of Capital	Count	0	23	34	9	11	7	84
	% of Total	0.0%	3.8%	5.6%	1.5%	1.8%	1.2%	13.9%
Lack of Strength	Count	0	11	1	1	6	12	31
	% of Total	0.0%	1.8%	0.2%	0.2%	1.0%	2.0%	5.1%
Total	Count	19	74	157	109	152	95	606
	% of Total	3.1%	12.2%	25.9%	18.0%	25.1%	15.7%	100.0%

Source: Researcher's Analysis (2018).

Table 4.48. Impediments to Adoption of Cassava between Sex Groups in Lacs District

Impediments to Adoption		Sex groups		Total
		Male	Female	
Inadequate rainfall in region	Count	87	118	205
	% of Total	14.7%	20.0%	34.7%
No rural training on cassava production	Count	66	88	154
	% of Total	11.2%	14.9%	26.1%
Difficulty in getting stems	Count	38	78	116
	% of Total	6.4%	13.2%	19.7%
Lack of Capital	Count	39	45	84
	% of Total	6.6%	7.6%	14.2%
Lack of Strength	Count	23	8	31
	% of Total	3.9%	1.4%	5.3%
Total	Count	253	337	590
	% of Total	42.9%	57.1%	100.0%

Source: Researcher's Analysis (2018).

The problem faced in adopting cassava among marital status groups is presented in Table 4.49. The result shows that 222 (37.5%) respondents affirmed the inadequate rainfall in the region to be the major problem faced in cassava adoption, of which 121 (20.4%) respondents are married; 74 (12.5%) single respondents were of the opinion that the difficulty of getting stems was an impediment merely 7 (1.2%) of the divorced respondents affirmed the lack of strength to be the problem faced in adopting cassava. Impediments to cassava adoption were cross tabulated among marital status groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among marital status across Lacs given that X^2=120.722; df =12, p=0.000.

Table 4.50 presents the problems faced in cassava adoption among annual income from cassava groups in Lacs district. The result reveals that 195 (36.4%) respondents reported the inadequate rainfall in the region as the major problem they face in cassava adoption in which 107 (20%) respondents earn less than 121,000FCFA while 42 (7.9%) respondents earning 141,000-160,000FCFA reported the lack of training on cassava production as an impediment and 16 (3%) respondents earning > 201,000FCFA indicated the difficulty in getting stems as the problem faced in cassava adoption. Impediments to cassava adoption were cross tabulated among annual income groups to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among annual income across Lacs given that X^2=217.903; df =20, p=0.000.

Table 4.49. Impediments to Adoption of Cassava among Marital Statuts Groups in Lacs District

Impediments to Adoption		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate rainfall in region	Count	121	57	23	21	222
	% of Total	20.4%	9.6%	3.9%	3.5%	37.5%
No rural training on cassava production	Count	87	63	0	4	154
	% of Total	14.7%	10.6%	0.0%	0.7%	26.0%
Difficulty in getting stems	Count	40	74	1	1	116
	% of Total	6.8%	12.5%	0.2%	0.2%	19.6%
Lack of Capital	Count	38	32	0	0	70
	% of Total	6.4%	5.4%	0.0%	0.0%	11.8%
Lack of Strength	Count	23	0	7	0	30
	% of Total	3.9%	0.0%	1.2%	0.0%	5.1%
Total	Count	309	226	31	26	592
	% of Total	52.2%	38.2%	5.2%	4.4%	100.0%

Source: Researcher's Analysis (2018).

Table 4.50. Impediments to Adoption of Cassava among Annual Income Groups in Lacs District

Impediments to Adoption		Annual Income from Cassava groups						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate rainfall in region	Count	107	42	2	32	9	3	195
	% of Total	20.0%	7.9%	0.4%	6.0%	1.7%	0.6%	36.4%
No rural training on cassava production	Count	30	14	42	7	27	27	147
	% of Total	5.6%	2.6%	7.9%	1.3%	5.0%	5.0%	27.5%
Difficulty in getting stems	Count	52	32	0	9	7	16	116
	% of Total	9.7%	6.0%	0.0%	1.7%	1.3%	3.0%	21.7%
Lack of Capital	Count	30	12	0	2	1	1	46
	% of Total	5.6%	2.2%	0.0%	0.4%	0.2%	0.2%	8.6%
Lack of Strength	Count	17	6	0	1	6	1	31
	% of Total	3.2%	1.1%	0.0%	0.2%	1.1%	0.2%	5.8%
Total	Count	236	106	44	51	50	48	535
	% of Total	44.1%	19.8%	8.2%	9.5%	9.3%	9.0%	100.0%

Source: Researcher's Analysis (2018).

The problem faced in cassava adoption among educational level groups of respondents is presented in Table 4.51. Two hundred and twenty-one (37.4%) respondents claimed that inadequate rainfall in the region was the major problem faced in cassava adoption in which 100 (16.9%) respondents had no formal education while 34 (5.8%) respondents with primary education reported the difficulty in getting cassava stems as an impediment and 1 (0.2%) respondent with secondary education indicated the lack of capital as the problem encountered in cassava adoption. Impediments to cassava adoption were cross tabulated among education level of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to adoption of cassava across Lacs varies significantly among education level given that X^2=37.735; df =12, p=0.000.

Table 4.52 presents the impediments to adoption of cassava among the number of children.. Two hundred and twenty-two (37%) respondents indicated the inadequate rainfall in the region as the major problem faced in cassava adoption in which 96 (16%) respondents had more than 5 children while 27 (4.5%) respondents who had less than 3 children indicated the lack of capital as the problem faced and 3 (0.5%) respondents with 3-5 children reported the lack of strength as an impediment to adopting cassava.

Impediments to cassava adoption were cross tabulated among number of children of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.53 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among number of children across Lacs given that X^2=48.934; df =12, p=0.000

Table 4.51. Impediments to adoption of cassava among education level groups in Lacs district

Impediments to Adoption		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate rainfall in region	Count	100	47	25	49	221
	% of Total	16.9%	8.0%	4.2%	8.3%	37.4%
No rural training on cassava production	Count	70	37	17	29	153
	% of Total	11.8%	6.3%	2.9%	4.9%	25.9%
Difficulty in getting stems	Count	30	34	21	31	116
	% of Total	5.1%	5.8%	3.6%	5.2%	19.6%
Lack of Capital	Count	29	26	1	14	70
	% of Total	4.9%	4.4%	0.2%	2.4%	11.8%
Lack of Strength	Count	17	7	7	0	31
	% of Total	2.9%	1.2%	1.2%	0.0%	5.2%
Total	Count	246	151	71	123	591
	% of Total	41.6%	25.5%	12.0%	20.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.52. Impediments to adoption of cassava among number of children groups in Lacs district

Impediments to Adoption		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Inadequate rainfall in region	Count	16	48	62	96	222
	% of Total	2.7%	8.0%	10.3%	16.0%	37.0%
No rural training on cassava production	Count	26	25	22	81	154
	% of Total	4.3%	4.2%	3.7%	13.5%	25.7%
Difficulty in getting stems	Count	6	30	21	59	116
	% of Total	1.0%	5.0%	3.5%	9.8%	19.3%
Lack of Capital	Count	14	27	11	25	77
	% of Total	2.3%	4.5%	1.8%	4.2%	12.8%
Lack of Strength	Count	0	7	3	21	31
	% of Total	0.0%	1.2%	0.5%	3.5%	5.2%
Total	Count	62	137	119	282	600
	% of Total	10.3%	22.8%	19.8%	47.0%	100.0%

Source: Researcher's Analysis (2018).

Table 4.53. Chi-square Result of impediments to Adoption of Cassava in District of Lacs

Impediments to adoption of cassava	District of Lacs			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate rainfall in region No rural training on cassava production Difficulty in getting stems Lack of Capital Lack of Strength	Age	151.056	20	Varies significantly
	Sex	17.710	4	Varies significantly
	Marital status	120.722	12	Varies significantly
	Annual Income	217.903	20	Varies significantly
	Education Level	37.735	12	Varies significantly
	Number of Children	48.934	12	Varies significantly

Source: Researcher's Analysis (2018).

4.7.3.3. Variation of impediments to adoption of cassava in Lagunes district

Table 4.54 presents the impediments to adoption of cassava among age groups across Lagunes district. 110 (44%) respondents indicated the lack of rural training on cassava production as the major problem to cassava adoption from which 28 (11.2%) respondents are 41-50 years old while 32 (12.8%) respondents aged 31-40 reported the difficulty in getting stems as an impediment and 1 (0.4%) respondent above 60 years old affirmed the inadequate rainfall in the region as the problem faced in cassava adoption in the region. Impediments to cassava adoption were cross tabulated among age groups across Lagunes district to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava adoption across Lagunes varies significantly among age of respondents given that X^2=61.241; df =20, p=0.000.

Table 4.55 indicates the problems faced in adopting cassava between sex groups. Based on the table, 110 (44%) respondents indicated the lack of rural training on cassava production from which there were 60 (24%) female respondents while 31 (12.4%) male respondents reported the inadequate rainfall in the region as an impediment; 47 (18.8%) female respondents claimed the difficulty in getting stems was a problem faced and only 2 (0.8%) male respondents indicated the lack of strength as an impediment to adopting cassava. Impediments to adoption of cassava were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava adoption across Lagunes varies significantly between sex of respondents given that X^2=19.111; df =4, p=0.001.

Table 4.54. Impediments to adoption of cassava among age groups in Lagunes district

Impediments to Adoption		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 – 60	>60	
Inadequate rainfall in region	Count	8	7	8	11	12	1	47
	% of Total	3.2%	2.8%	3.2%	4.4%	4.8%	0.4%	18.8%
No rural training on cassava production	Count	9	20	20	28	24	9	110
	% of Total	3.6%	8.0%	8.0%	11.2%	9.6%	3.6%	44.0%
Difficulty in getting stems	Count	2	5	32	23	12	0	74
	% of Total	0.8%	2.0%	12.8%	9.2%	4.8%	0.0%	29.6%
Lack of Capital	Count	1	2	3	0	0	2	8
	% of Total	0.4%	0.8%	1.2%	0.0%	0.0%	0.8%	3.2%
Lack of Strength	Count	1	0	0	8	0	2	11
	% of Total	0.4%	0.0%	0.0%	3.2%	0.0%	0.8%	4.4%
Total	Count	21	34	63	70	48	14	250
	% of Total	8.4%	13.6%	25.2%	28.0%	19.2%	5.6%	100.0%

Source: Researcher's Analysis (2018).

Table 4.55. Impediments to adoption of cassava between sex groups in Lagunes district

Impediments to Adoption		Sex groups		Total
		Male	Female	
Inadequate rainfall in region	Count	31	16	47
	% of Total	12.4%	6.4%	18.8%
No rural training on cassava production	Count	50	60	110
	% of Total	20.0%	24.0%	44.0%
Difficulty in getting stems	Count	27	47	74
	% of Total	10.8%	18.8%	29.6%
Lack of Capital	Count	7	1	8
	% of Total	2.8%	0.4%	3.2%
Lack of Strength	Count	2	9	11
	% of Total	0.8%	3.6%	4.4%
Total	Count	117	133	250
	% of Total	46.8%	53.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.56 shows the impediments to adoption of cassava among marital status groups in Lagunes district. One hundred and ten (45.3%) of the respondents indicated the lack of rural training on cassava production as the main problem faced from which there were 67 (27.6%) married respondents; 17 (7%) single respondents reported the difficulty in getting cassava stem and 1 (0.4%) divorced respondent claimed the lack of strength was an impediment. Impediments to cassava adoption were cross tabulated among marital status groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among marital status across Lagunes given that X^2=49.272; df =12, p=0.000.

The problems faced in adoption of cassava in Lagunes among annual income groups made from cassava is presented in Table 4.57. With 110 (45.3%) respondents indicated the lack of rural training on cassava production as the problem faced. With 49 (20.2%) earning less than 121,000FCFA annually while 10 (4.1%) earning 181,000-200,000FCFA annually reported the difficulty in getting cassava stem as an impediment and 1 (0.4%) respondent earning over 200,000FCFA annually claimed the lack of capital as a problem faced in adopting cassava. Impediments to cassava adoption were cross tabulated among income groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicates that at a given probability level of 0.05 and confidence level of 95%, the impediments to cassava adoption varies significantly among annual income (X^2=51.947; df =16, p=0.000).

Table 4.56. Impediments to adoption of cassava among marital status groups in Lagunes district

Impediments to Adoption		Marital status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate rainfall in region	Count	39	7	1	0	47
	% of Total	16.0%	2.9%	0.4%	0.0%	19.3%
No rural training on cassava production	Count	67	38	5	0	110
	% of Total	27.6%	15.6%	2.1%	0.0%	45.3%
Difficulty in getting stems	Count	40	17	1	9	67
	% of Total	16.5%	7.0%	0.4%	3.7%	27.6%
Lack of Capital	Count	5	3	0	0	8
	% of Total	2.1%	1.2%	0.0%	0.0%	3.3%
Lack of Strength	Count	1	9	1	0	11
	% of Total	0.4%	3.7%	0.4%	0.0%	4.5%
Total	Count	152	74	8	9	243
	% of Total	62.6%	30.5%	3.3%	3.7%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.57. Impediments to adoption of cassava among annual income groups in Lagunes district

Impediments to Adoption		Annual Income from Cassava groups					Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate rainfall in region	Count	21	4	0	10	12	47
	% of Total	8.6%	1.6%	0.0%	4.1%	4.9%	19.3%
No rural training on cassava production	Count	49	2	26	15	18	110
	% of Total	20.2%	0.8%	10.7%	6.2%	7.4%	45.3%
Difficulty in getting stems	Count	35	11	10	10	1	67
	% of Total	14.4%	4.5%	4.1%	4.1%	0.4%	27.6%
Lack of Capital	Count	3	3	1	0	1	8
	% of Total	1.2%	1.2%	0.4%	0.0%	0.4%	3.3%
Lack of Strength	Count	8	0	0	2	1	11
	% of Total	3.3%	0.0%	0.0%	0.8%	0.4%	4.5%
Total	Count	116	20	37	37	33	243
	% of Total	47.7%	8.2%	15.2%	15.2%	13.6%	100.0%

Source: Researcher's Analysis (2018).

Table 4.58 indicates the impediments to adoption of cassava among educational level groups of respondents. One hundred and ten (44%) respondents indicated the lack of rural training on cassava production as the major problem faced from which 49 (19.6%) respondents have a primary education while 38 (15.2%) secondary school leavers reported the difficulty in getting cassava stem as an impediment and 2 (0.8%) tertiary graduates indicated the inadequate rainfall in the region as problem faced in adopting cassava in the area. Impediments to adoption of cassava were cross tabulated among educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to adoption of cassava among education across Lagunes given that X^2=59.765; df =12, p=0.000

Table 4.59 shows the problems faced in adoption of cassava among number of children. One hundred and ten (44%) respondents indicated the lack of rural training on cassava production from which 39 (15.6%) respondents have more than 5 children while 24 (9.6%) respondents with less than 3 children reported the difficulty of getting cassava stem as a problem; 18 (7.2%) respondents with 3-5 children affirmed the inadequate rainfall in the region and only 1 (0.4%) respondent with no child indicated the lack of strength as an impediment. Impediments to adoption of cassava were cross tabulated among number of children groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.60 indicate that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava adoption across Lagunes did not varies significantly among number of children of respondents given that X^2=17.639; df =12, p=0.127.

Table 4.58. Impediments to adoption of cassava among education level groups in Lagunes district

Impediments to Adoption		Education level groups				Total
		No Formal Education	**Primary Education**	**Secondary Education**	**Tertiary Education**	
Inadequate rainfall in region	Count	9	10	26	2	47
	% of Total	3.6%	4.0%	10.4%	0.8%	18.8%
No rural training on cassava production	Count	34	49	18	9	110
	% of Total	13.6%	19.6%	7.2%	3.6%	44.0%
Difficulty in getting stems	Count	22	14	38	0	74
	% of Total	8.8%	5.6%	15.2%	0.0%	29.6%
Lack of Capital	Count	0	6	2	0	8
	% of Total	0.0%	2.4%	0.8%	0.0%	3.2%
Lack of Strength	Count	0	9	2	0	11
	% of Total	0.0%	3.6%	0.8%	0.0%	4.4%
Total	Count	65	88	86	11	250
	% of Total	26.0%	35.2%	34.4%	4.4%	100.0%

Source: Researcher's Analysis (2018).

Table 4.59. Impediments to adoption of cassava among number of children groups in Lagunes district

Impediments to Adoption		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Inadequate rainfall in region	Count	8	10	18	11	47
	% of Total	3.2%	4.0%	7.2%	4.4%	18.8%
No rural training on cassava production	Count	14	24	33	39	110
	% of Total	5.6%	9.6%	13.2%	15.6%	44.0%
Difficulty in getting stems	Count	12	24	20	18	74
	% of Total	4.8%	9.6%	8.0%	7.2%	29.6%
Lack of Capital	Count	1	3	3	1	8
	% of Total	0.4%	1.2%	1.2%	0.4%	3.2%
Lack of Strength	Count	1	1	1	8	11
	% of Total	0.4%	0.4%	0.4%	3.2%	4.4%
Total	Count	36	62	75	77	250
	% of Total	14.4%	24.8%	30.0%	30.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.60. Chi-square Result of impediments to Adoption of Cassava in District of Lagunes

Impediments to adoption of cassava	District of Lagunes			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate rainfall in region No rural training on cassava production Difficulty in getting stems Lack of Capital Lack of Strength	Age	61.241	20	Varies significantly
	Sex	19.111	4	Varies significantly
	Marital status	49.272	12	Varies significantly
	Annual Income	51.947	16	Varies significantly
	Education Level	59.765	12	Varies significantly
	Number of Children	17.639	12	Not significant vaiation

Source: Researcher's Analysis (2018).

4.7.4. Variation of impediments to cultivation of cassava among socio-economic characteristics

Table 4.61 indicates the impediments to cultivation of cassava among age groups. The first impediments to cultivation of cassava in the whole study area was the fluctuating price of cassava. Out of the total number of respondents (4000 farmers), only 3,292 respondents stated that they faced some impediments in the cultivation of cassava. It was noted that the age group which account for the largest portion of the respondents that face these impediments is between 41 and 50 years old accounting for 827 respondents. Following this closely is the age group of 31and 40 years that account for 795 respondents who stated having encountered impediments during cultivation, following this is the age group 51-60 years which account for 560 respondents, the age group 21 and 30 years followed closely accounting for 497 respondents, 392 respondents were above 60 years old, while 221 respondents were lesser than 21 years old.

Furthermore, it was discovered that the fluctuating price of cassava constituted a substantial portion of the impediments to cultivation of cassava and accounted for 41.8% (1378 respondents) of the response given by respondents. The problem of pests and rodents which account for 15.8% (519 respondents), lack of equipment to process accounted for 12.9% (424 respondents), inadequate rainfall accounted for 9.8% (322 respondents), insufficient man power and lack of arable land both accounted for 5.3% (173 respondents) and 5.1% (169 respondents) respectively, while the others such as lack of fertilizer, high price of getting cassava stems, lack of machinery, poor soil fertility, insufficient capital, difficulty in getting cassava stems, and transportation all account for 0.1%, 2.2%, 1.2%, 1.6%, 0.5%, 1.3% and 2.4% respectively.

The impediments to cultivation of cassava among age groups of respondents was tested using the Pearson's Chi square test of relationship. These impediments were cross-tabulated with the age of respondents (Tabe 4.67) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, there is a significant variation (Chi Square= 718.029, Sig. =.000), among the impediments to cultivation of cassava and age of respondents.

Impediments for cultivation		Age groups						Aggregate
		<21	21 -	31 –	41 -	51 -	>60	
Inadequate Rainfall	Number	27	44	60	76	84	31	322
	Percentage	12.2%	8.8%	7.5%	9.2%	15%	7.9%	9.8%
Lack of Fertilizer	Number	0	0	0	0	4	0	4
	Percentage	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.1%
Pests and Rodents	Number	32	43	145	114	93	92	519
	Percentage	14.5%	8.6%	18.2%	13.8%	16.6%	23.5%	15.8%
High Price of getting	Number	0	21	4	14	25	9	73
	Percentage	0.0%	4.2%	0.5%	1.7%	4.5%	2.3%	2.2%
Lack of Machinery	Number	0	9	10	9	12	0	40
	Percentage	0.0%	1.8%	1.2%	1.1%	2.1%	0.0%	1.2%
Insufficient Manpower	Number	15	12	66	64	13	3	173
	Percentage	6.8%	2.4%	8.3%	7.7%	2.3%	0.8%	5.3%
Poor Soil Fertility	Number	0	1	6	13	23	10	53
	Percentage	0.0%	0.2%	0.7%	1.6%	4.1%	2.5%	1.6%
Insufficient Capital	Number	8	7	0	1	0	0	16
	Percentage	3.6%	1.4%	0.0%	0.1%	0.0%	0.0%	0.5%
Lack of Arable land	Number	1	8	42	101	7	10	169
	Percentage	0.4%	1.4%	1.3%	12.2%	1.2%	2.5%	5.1%
Difficulty in getting	Number	0	0	22	22	0	0	44
	Percentage	0.0%	0.0%	2.8%	2.7%	0.0%	0.0%	1.3%
No Equipment to Process	Number	94	61	83	62	77	47	424
	Percentage	42.5%	12.3%	10.4%	7.5%	13.7%	12%	12.9%
Transportation	Number	0	14	12	33	2	18	79
	Percentage	0.0%	2.8%	1.5%	4%	0.3%	4.6%	2.4%
Fluctuating Price of	Number	44	277	345	318	220	172	1376
	Percentage	19.9%	45.7%	43.4%	38.4%	39.3%	43.9%	41.8%
Total	Number	221	497	795	827	560	392	3292

	Percentage	100%	100%	100%	100%	100%	100%	100.0%

Table 4.61. Impediments to Cultivation among Age Groups

Source: Researcher's Analysis (2018).

Table 4.62 indicates the variartion of impediments to cultivation of cassava between sex groups. There are more women who reported the impediments farmers face in cultivating cassava than men. Out of the total count of respondents (4000 farmers) only 3259 reported their gender with respect to the impediments to the cultivation of cassava. It was noted that the female gender accounted for the larger portion 53.5% (1743 respondents) of the respondents that face these impediments, while their male counterpart accounted for 47.5% (1516 respondents), and as earlier pointed out, cassava is attributed to women due to the ease of production and processing according to the respondents.

In addition, the observation of the table shows that fluctuating price of cassava is the most important problem in cassava cultivation. The sex most concerned is the male with 701 (46.2%) against 667 (38.2%) female. Add to these difficulties, pests and no equipment to process. They occupy respectively 502 (14.4%) and 424 (13%) with the second considred to be an important part of the woman against the man in no equipment to process. Finally, lack of fertilizer is the last problem in cassava cultivation in our study area. The majority proportion is that of men with 4 (0.3%).

The nature of the variation of impediments to cultivation of cassava between sex groups of respondents was tested using the Pearson's chi square test of relationship. These impediments were cross-tabulated with the sex groups of respondents (Table 4.67) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, there is a significant variation (Chi Square=111.211, Sig. =.000), between the impediments to cultivation and sex of respondents.

Table 4.62. Impediments of Cassava Cultivation between Sex Groups

Impediments for cultivation		Sex groups		Aggregate
		Male	Female	
Inadequate Rainfall	Number	143	172	315
	Percentage	9.4%	9.9%	9.7%
Lack of Fertilizer	Number	4	0	4
	Percentage	0.3%	0.0%	0.1%
Pests and Rodents	Number	146	356	502
	Percentage	9.6%	20.4%	15.4%
High Price of getting Cassava Stems	Number	43	30	73
	Percentage	2.8%	1.7%	2.2%
Lack of Machinery	Number	21	19	40
	Percentage	1.4%	1.1%	1.2%
Insufficient Manpower	Number	69	103	172
	Percentage	4.5%	5.9%	5.3%
Poor Soil Fertility	Number	34	19	53
	Percentage	2.2%	1.1%	1.6%
Insufficient Capital	Number	8	8	16
	Percentage	0.5%	0.4%	0.5%
Lack of Arable land	Number	70	99	169
	Percentage	4.6%	5.7%	5.2%
Difficulty in getting Cassava stems	Number	11	33	44
	Percentage	0.7%	1.9%	1.4%
No Equipment to Process	Number	223	201	424
	Percentage	14.7%	11.5%	13.0%
Transportation	Number	43	36	79
	Percentage	2.8%	2.2%	2.4%
Fluctuating Price of Cassava	Number	701	667	1368
	Percentage	46.2%	38.2%	42.0%
Total	Number	1516	1743	3259
	Percentage	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.63 revealed the impediments to cultivation of cassava among marital status. There are more married respondents who cultivate cassava. Out of the total respondents; 1,768 respondents stated that they were married which accounts for the largest portion of the total respondents, single adopters accounted for 1,223 respondents, divorced adopters were 133 respondents, while the widowed adopters also accounted for 132 respondents.

The fluctuating price of cassava constituted a substantial portion of the impediments to cultivation and accounted for 41.2% (1,343 respondents) of the response given by respondents with 797 (45%) married, following this is the problem of pests and rodents which account for 15.9% (519 respondents) with 264 (14.9%) married, lack of equipment to process accounted for 13.0% (423 respondents), inadequate rainfall accounted for 9.9% (322 respondents), insufficient manpower and lack of arable land both accounted for 5.3% (172 respondents) and 5.2% (169 respondents) respectively, while the others such as lack of fertilizer, high price of getting cassava stems, lack of machinery, poor soil fertility, insufficient capital, difficulty in getting cassava stems, and transportation all account for 0.1%, 2.2%, 1.2%, 1.6%, 0.5%, 1.3%, 2.4% respectively.

The impediments to cultivation of cassava among marital status groups of respondents was tested using the Pearson's Chi square test of relationship. These impediments were cross-tabulated with the marital status groups of respondents (Table 4.67) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, that there is a significant variation (Chi Square= 386.020, Sig. =.000), among the impediments to cultivation and marital status of respondents.

Table 4.63. Impediments of Cassava Cultivation among Marital Status Groups

Impediments for cultivation		Marital Status groups				Aggregate
		Married	Single	Divorced	Widowed	
Inadequate Rainfall	Number	149	124	21	28	322
	Percentage	8.4%	10.1%	15.8%	21.2%	9.9%
Lack of Fertilizer	Number	0	4	0	0	4
	Percentage	0.0%	0.3%	0.0%	0.0%	0.1%
Pests and Rodents	Number	264	205	32	18	519
	Percentage	14.9%	12.8%	24%	13.6%	15.9%
High Price of getting Cassava Stems	Number	50	13	9	0	72
	Percentage	2.8%	1.06%	6.8%	0.0%	2.2%
Lack of Machinery	Number	23	10	7	0	40
	Percentage	1.3%	0.8%	5.3%	0.0%	1.2%
Insufficient Manpower	Number	107	47	18	0	172
	Percentage	6.05%	3.8%	13.5%	0.0%	5.3%
Poor Soil Fertility	Number	27	13	0	13	53
	Percentage	1.5%	1.06%	0.0%	9.8%	1.6%
Insufficient Capital	Number	7	9	0	0	16
	Percentage	0.3%	0.7%	0.0%	0.0%	0.5%
Lack of Arable land	Number	107	36	0	26	169
	Percentage	6.05%	2.9%	0.0%	19.7%	5.2%
Difficulty in getting Cassava stems	Number	11	33	0	0	44
	Percentage	0.6%	2.7%	0.0%	0.0%	1.4%
No Equipment to Process	Number	177	205	17	24	423
	Percentage	10%	12.8%	12.8%	18.1%	13.0%
Transportation	Number	49	19	11	0	79
	Percentage	2.8%	1.5%	8.3%	0.0%	2.4%
Fluctuating Price of Cassava	Number	797	505	18	23	1343
	Percentage	45%	41.3%	13.5%	17.4%	41.2%
Total	Number	1768	1223	133	132	3256
	Percentage	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Researcher's Analysis (2018).

It can be observed from Table 4.64 that most of the respondents in this category who stated their encountered impediments fall in the category of respondents that earn less than 121,000 FCFA, thus accounting for 1276 respondents of the total respondents.

The fluctuating price of cassava accounted for a substantial portion of the impediments to cultivation at 43.0% (1355 respondents) of the respondents. People experiencing this difficulty have an annual income of less than 120,000 CFA francs. They are followed by those with more than 201,000 FCFA, ie 38.1%.

The problem of pests and rodents accounted for 14.3% (450 respondents), lack of equipment to process accounted for 13.4% (422 respondents), inadequate rainfall accounted for 9.8% (308 respondents), insufficient manpower and lack of arable land both accounted for 5.3% (166 respondents) and 4.9% (155 respondents) respectively, while the others such as lack of fertilizer, high price of cassava stems, lack of machinery, poor soil fertility, insufficient capital, difficulty in getting cassava stems, and transportation all account for 0.1%, 2.3%, 1.3%, 1.3%, 0.5%, 1.4%, 2.5% (4, 72, 40, 42, 16, 44, 79 respondents) respectively.

Table 4.67 indicates the Pearson's Chi-square test of a relationship. These impediments were cross-tabulated with the income groups of respondents in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, the Chi-square test revealed that there is a significant variation (Chi Square= 994.543, Sig. =.000), among the impediments to cultivation and income groups of respondents.

Table 4.64. Impediments of Cultivation of Cassava among Income Groups from Cassava

Impediments for cultivation		Annual Income from Cassava groups						Aggregate
		<121 000 FCFA	121 000- 140 000 FCFA	141 000- 160 000 FCFA	161 000- 180 000FCFA	181 000- 200 000FCFA	>201 000FCFA	
Inadequate Rainfall	Number	146	27	33	29	28	45	308
	Percentage	11.4%	5.7%	21.3%	10.6%	6.2%	8.5%	9.8%
Lack of Fertilizer	Number	4	0	0	0	0	0	4
	Percentage	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Pests and Rodents	Number	233	70	12	44	51	40	450
	Percentage	18.3%	14.8%	7.7%	16%	11.3%	7.6%	14.3%
High Price of getting Cassava Stems	Number	37	11	2	2	10	10	72
	Percentage	2.9%	2.3%	1.3%	0.7%	2.2%	1.9%	2.3%
Lack of Machinery	Number	18	9	0	0	4	9	40
	Percentage	1.4%	1.9%	0.0%	0.0%	0.9%	1.7%	1.3%
Insufficient Manpower	Number	82	41	18	11	4	10	166
	Percentage	6.4%	8.7%	11.6%	4%	0.9%	1.9%	5.3%
Poor Soil Fertility	Number	5	13	0	2	4	18	42
	Percentage	0.4%	2.7%	0.0%	0.7%	0.9%	3.4%	1.3%
Insufficient Capital	Number	9	0	0	0	0	7	16
	Percentage	0.7%	0.0%	0.0%	0.0%	0.0%	1.3%	0.5%
Lack of Arable land	Number	59	58	0	21	17	0	155
	Percentage	4.6%	12.3%	0.0%	7.7%	3.8%	0.0%	4.9%
Difficulty in getting Cassava stems	Number	44	0	0	0	0	0	44
	Percentage	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
No Equipment to Process	Number	59	14	13	5	146	185	422
	Percentage	4.6%	3%	8.4%	1.8%	32.5%	35.1%	13.4%
Transportation	Number	0	37	17	0	23	2	79
	Percentage	0.0%	7.8%	11%	0.0%	5.1%	0.4%	2.5%
Fluctuating Price of Cassava	Number	580	192	60	160	162	201	1355
	Percentage	45.4%	40.7%	38.7%	58.1%	36%	38.1%	43.0%
	Number	1276	472	155	274	449	527	3153

	Percentage	100%	100%	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.65 shows the impediments to cultivation of cassava among education level. The educational level as reported by the respondents ranges from no formal education to tertiary education. Out of the total respondents of 4000, only 3181 respondents stated their educational status and claimed that they encounter impediments when cultivating cassava. Farmers who have primary education accounted for 1243 respondents in this category. In addition, it was also observed that the fluctuating price of cassava accounted for a substantial portion of the impediments to cultivation of cassava at 41.9% (1333 respondents) of the respondents, with primary education.

The problem of pests and rodents accounted for 15.8% (508 respondents), with no formal education. Lack of equipment to process accounted for 13.0% (415 respondents), inadequate rainfall accounted for 9.7% (308 respondents), insufficient manpower and lack of arable land both accounted for 4.8% (153 respondents) and 5.3% (168 respondents) respectively while the others such as lack of fertilizer, high price of getting cassava stems, lack of machinery, poor soil fertility, insufficient capital, difficulty in getting cassava stems, and transportation all account for 0.1%, 2.3%, 1.3%, 1.4%, 0.5%, 1.4%, 2.5% (that is 4, 72, 40, 44, 16, 44, 79 respondents for each category) respectively.

The impediments to cultivation of cassava among educational level groups of respondents was tested using Pearson's Chi-square test of a relationship (Table 4.67). These impediments were cross-tabulated with the educational level of respondents in order to ascertain the significance of the variation. At a set significance level of 0.05 and a confidence interval of 95%, the Chi-square test revealed that there is a significant variation (Chi Square= 324.434, Sig. =.000), between the impediments to cultivation and the educational level groups of respondents.

Table 4.65. Impediments to Cultivation of Cassava among Education Level Groups

Impediments for cultivation		Education Status groups				Aggregate
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate Rainfall	Number	96	109	95	8	308
	Percentage	9.1%	8.8%	12.4%	6.5%	9.7%
Lack of Fertilizer	Number	4	0	0	0	4
	Percentage	0.4%	0.0%	0.0%	0.0%	0.1%
Pests and Rodents	Number	164	157	113	70	504
	Percentage	15.6%	12.6%	14.8%	56.9%	15.8%
High Price of getting Cassava Stems	Number	10	28	34	1	73
	Percentage	0.9%	2.2%	4.4%	0.8%	2.3%
Lack of Machinery	Number	16	6	18	0	40
	Percentage	1.5%	0.5%	2.3%	0.0%	1.3%
Insufficient Manpower	Number	53	70	30	0	153
	Percentage	5%	5.6%	3.9%	0.0%	4.8%
Poor Soil Fertility	Number	8	24	12	0	44
	Percentage	0.8%	1.9%	1.6%	0.0%	1.4%
Insufficient Capital	Number	1	8	7	0	16
	Percentage	0.1%	0.6%	0.9%	0.0%	0.5%
Lack of Arable land	Number	76	55	37	0	168
	Percentage	7.2%	4.4%	4.8%	0.0%	5.3%
Difficulty in getting Cassava stems	Number	22	11	11	0	44
	Percentage	2.1%	0.9%	1.4%	0.0%	1.4%
No Equipment to Process	Number	107	221	87	0	415
	Percentage	10.2%	17.8%	11.4%	0.0%	13.0%
Transportation	Number	21	35	12	11	79
	Percentage	2%	17.8%	1.6%	8.9%	2.5%
Fluctuating Price of Cassava	Number	474	519	307	33	1333
	Percentage	45%	41.7%	40.2%	26.8%	41.9%
Total	Number	1052	1243	763	123	3181
	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

The number of children as reported by the respondents, ranged from 0 to above 5 children, with the understanding that the labour required as well as the cost of labour is of importance to farmers and might have influenced their decision to cultivate cassava despite the impediments experienced.

Out of the total respondents, 3197 respondents who stated the number of children they have, also stated that they encounter impediments during cassava cultivation (Table 4.66). Farmers who have less than 5 children constitutes the highest portion of 1,129 respondents. In addition to the foregoing, the fluctuating price of cassava accounted for a substantial portion of the impediments to cultivation at 41.2% (1316 respondents) of the total respondents with 473 (41.9%).

The problem of pests and rodents accounted for 16.2% (519 respondents), lack of equipment to process accounted for 13.2% (423 respondents) with 3-5 children. Inadequate rainfall accounted for 9.6% (307 respondents), insufficient manpower and lack of arable land both accounted for 5.4% (173 respondents) and 5.3% (169 respondents) respectively, while the others such as lack of fertilizer, high price of getting cassava stems, lack of machinery, poor soil fertility, insufficient capital, difficulty in getting cassava stems, and transportation all account for 0.1%, 2.0%, 1.3%, 1.4%, 0.5%, 1.4%, 2.5% (that is 4, 63, 40, 44, 16, 44, 79 respondents for each category) respectively.

The nature of the variation of impediments to cultivation of cassava among number of children groups of respondents was tested using Pearson's chi-square test of a relationship. These impediments were cross-tabulated with the number of children of respondents (Table 4.67) in order to ascertain the significance of the variation. At a set significance level of 0.05, and a confidence interval of 95%, there is a significant variation (Chi Square= 382.366, Sig. =.000), among the impediments to cultivation of cassava and the number of children groups of respondents.

Table 4.66. Impediments to Cultivation of Cassava among Number of Children Groups

Impediments for cultivation		Number of children groups				Aggregate
		None	Less than 3	3 - 5	Above 5	
Inadequate Rainfall	Number	28	65	108	106	307
	Percentage	8.2%	9.7%	10.2%	9.4%	9.6%
Lack of Fertilizer	Number	0	0	4	0	4
	Percentage	0.0%	0.0%	0.4%	0.0%	0.1%
Pests and Rodents	Number	44	77	135	263	519
	Percentage	12.8%	11.5%	12.8%	23.3%	16.2%
High Price of getting Cassava Stems	Number	1	10	40	12	63
	Percentage	0.3%	1.5%	3.9%	1.1%	2.0%
Lack of Machinery	Number	19	1	20	0	40
	Percentage	5.5%	0.1%	1.9%	0.0%	1.3%
Insufficient Manpower	Number	0	18	89	66	173
	Percentage	0.0%	2.7%	8.4%	5.8%	5.4%
Poor Soil Fertility	Number	1	11	19	13	44
	Percentage	0.3%	1.6%	1.8%	1.1%	1.4%
Insufficient Capital	Number	8	7	0	1	16
	Percentage	2.3%	1%	0.0%	0.08%	0.5%
Lack of Arable land	Number	29	18	64	58	169
	Percentage	8.4%	2.7%	6.05	5.1%	5.3%
Difficulty in getting Cassava stems	Number	11	22	0	11	44
	Percentage	3.2%	3.3%	0.0%	1%	1.4%
No Equipment to Process	Number	77	115	130	101	423
	Percentage	22.4%	17.2%	12.3%	8.9%	13.2%
Transportation	Number	7	32	15	25	79
	Percentage	2%	4.8%	1.4%	2.2%	2.5%
Fluctuating Price of Cassava	Number	118	292	433	473	1316
	Percentage	34.4%	43.7%	41%	41.9%	41.2%
Total	Number	343	668	1057	1129	3197

	Percentage	100%	100%	100%	100%	100.0%

Source: Researcher's Analysis (2018).

Table 4.67. Chi-square Result of impediments to cultivation of cassava among socio-economics characteristics

Impediments to cultivation of cassava	Chi-square Result across the Districts			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate Rainfall Pests and Rodents High Price of getting Cassava Stems Lack of Machinery Insufficient Manpower Poor Soil Fertility Insufficient Capital Lack of Arable land Difficulty in getting Cassava stems No Equipment to Process Transportation Fluctuating Price of Cassava	Age	718.029	60	Varies significantly
	Sex	111.211	12	Varies significantly
	Marital status	386.020	36	Varies significantly
	Annual Income	994.543	60	Varies significantly
	Education Level	324.434	36	Varies significantly
	Number of Children	382.366	36	Varies significantly

Source: Researcher's Analysis (2018).

4.7.5. Variation of impediments to cultivation of cassava across each districts

4.7.5.1. Variation of impediments to cultivation of cassava in Comoé district

Table 4.68 indicates the impediments to cultivation of cassava among age groups. More than half of the respondents (57.5%) disclosed the fluctuating price of cassava to be the problem faced in cassava cultivation, of which 205 (16.4%) are in the age group 31-40; 30 (2.4%) respondents in age group 41-50 indicated the inadequate rainfall to be an impediment; 35 (2.8%) in the age group >60 disclosed that pests and rodents were the major problem faced and 9 (0.7%) respondents in the age group <21 affirmed that insufficient manpower was the problem faced in cultivating cassava.

Impediments to cultivation of cassava were cross tabulated among age of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.74 reveals that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava cultivation varies significantly across Comoé on the basis of age given that X^2=412.414; df =50, p=0.000.

Impediments to cultivation of cassava between sex are presented in Table 4.69 based on the table, the majority of 712(57.8%) respondents affirmed that the fluctuating price of cassava was the major problem faced, of which 374 (30%) are males; 69 (5.5%) females indicated that pests and rodents was an impediment; 66 (5.3%) males were of the opinion that the lack of equipment to process cassava was the problem faced and 50 (4%) females revealed that insufficient manpower was an impediment to cassava cultivation.

Impediments to cultivation of cassava were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.74 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cultivation of cassava varies significantly between sex groups in Comoé district by (X^2=63.562; df =10, p=0.000).

Table 4.68. Impediments to cultivation of cassava among age groups in Comoé district

Impediments for cultivation		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 – 60	>60	
Inadequate Rainfall	Count	9	21	18	30	16	8	102
	% of Total	0.7%	1.7%	1.4%	2.4%	1.3%	0.6%	8.1%
Pests and Rodents	Count	8	7	22	29	15	35	116
	% of Total	0.6%	0.6%	1.8%	2.3%	1.2%	2.8%	9.3%
High Price of getting Cassava Stems	Count	0	14	1	1	7	8	31
	% of Total	0.0%	1.1%	0.1%	0.1%	0.6%	0.6%	2.5%
Lack of Machinery	Count	0	8	0	0	0	0	8
	% of Total	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.6%
Insufficient Manpower	Count	9	0	50	23	0	0	82
	% of Total	0.7%	0.0%	4.0%	1.8%	0.0%	0.0%	6.5%
Poor Soil Fertility	Count	0	1	1	9	1	0	12
	% of Total	0.0%	0.1%	0.1%	0.7%	0.1%	0.0%	1.0%
Lack of Arable	Count	0	8	1	16	0	0	25

land	% of Total	0.0%	0.6%	0.1%	1.3%	0.0%	0.0%	2.0%
Difficulty in getting Cassava stems	Count	0	0	8	0	0	0	8
	% of Total	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.6%
No Equipment to Process	Count	0	8	31	17	38	32	126
	% of Total	0.0%	0.6%	2.5%	1.4%	3.0%	2.6%	10.1%
Transportation	Count	0	0	0	15	1	7	23
	% of Total	0.0%	0.0%	0.0%	1.2%	0.1%	0.6%	1.8%
Fluctuating Price of Cassava	Count	9	165	205	171	108	62	720
	% of Total	0.7%	13.2%	16.4%	13.6%	8.6%	4.9%	57.5%
Total	Count	35	232	337	311	186	152	1253
	% of Total	2.8%	18.5%	26.9%	24.8%	14.8%	12.1%	100.0%

Source: Researcher's Analysis (2018).

Table 4.69. Impediments to cultivation of cassava between sex groups in Comoé district

Impediments for cultivation		Sex groups		Total
		Male	Female	
Inadequate Rainfall	Count	58	37	95
	% of Total	4.7%	3.0%	7.6%
Pests and Rodents	Count	47	69	116
	% of Total	3.8%	5.5%	9.3%
High Price of getting Cassava Stems	Count	20	11	31
	% of Total	1.6%	0.9%	2.5%
Lack of Machinery	Count	8	0	8
	% of Total	0.6%	0.0%	0.6%
Insufficient Manpower	Count	32	50	82
	% of Total	2.6%	4.0%	6.6%
Poor Soil Fertility	Count	11	1	12
	% of Total	0.9%	0.1%	1.0%
Lack of Arable land	Count	8	17	25
	% of Total	0.6%	1.4%	2.0%
Difficulty in getting Cassava stems	Count	0	8	8
	% of Total	0.0%	0.6%	0.6%
No Equipment to Process	Count	66	60	126

	% of Total	5.3%	4.8%	10.1%
Transportation	Count	1	22	23
	% of Total	0.1%	1.8%	1.8%
Fluctuating Price of Cassava	Count	374	345	719
	% of Total	30.0%	27.7%	57.8%
Total	Count	625	620	1245
	% of Total	50.2%	49.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.70 indicates the variation of impediments to cultivation of cassava among marital statuts groups. The results presented reveals that 705 (57%) respondents indicated the fluctuating price of cassava was the major problem faced in cultivation of cassava, of which 453 (36.7%) are married; 29 (2.3%) married respondents indicated the high price of getting cassava stems was the problem faced; 21(1.7%) widowed respondents affirmed the inadequate rainfall to be an impediment to cassava cultivation and 77 (6.2%) married respondents indicated the lack of equipment to process cassava was an impediment to the cultivation of cassava. Impediments to cassava cultivation were cross tabulated among marital status groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.74 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava cultivation varies significantly across Comoé among marital status given that X^2=414.827; df =30, p=0.000.

Table 4.71 shows the impediements to cultivation of cassava among annual income groups. With regards to annual income from cassava, 715 (58.7%) respondents were of the opinion that fluctuating price of cassava was the major problem faced in cultivating cassava, of which 234 (19.2%) respondents earned less than 21,000FCFA; 66 (5.4%) respondents with earnings >201,000FCFA indicated the lack of equipment to process cassava to be a major problem and 15 (1.2%) respondents earning 121,000-140,000 confirmed that transportation was an impediment to cassava cultivation. Impediments to cassava cultivation were cross tabulated among annual income groups to ascertain the significance of the variation. The result of the chi square test in Table 4.74 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to cultivation of cassava among annual income across Comoe given that X^2=429.776; df =50, p=0.000.

Table 4.70. Impediments to cultivation of cassava among marital statuts groups in Comoé district

Impediments for cultivation		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate Rainfall	Count	44	37	0	21	102
	% of Total	3.6%	3.0%	0.0%	1.7%	8.3%
Pests and Rodents	Count	72	36	8	0	116
	% of Total	5.8%	2.9%	0.6%	0.0%	9.4%
High Price of getting Cassava Stems	Count	29	1	0	0	30
	% of Total	2.3%	0.1%	0.0%	0.0%	2.4%
Lack of Machinery	Count	8	0	0	0	8
	% of Total	0.6%	0.0%	0.0%	0.0%	0.6%
Insufficient Manpower	Count	42	24	16	0	82
	% of Total	3.4%	1.9%	1.3%	0.0%	6.6%
Poor Soil Fertility	Count	3	9	0	0	12
	% of Total	0.2%	0.7%	0.0%	0.0%	1.0%

Lack of Arable land	Count	18	7	0	0	25
	% of Total	1.5%	0.6%	0.0%	0.0%	2.0%
Difficulty in getting Cassava stems	Count	0	8	0	0	8
	% of Total	0.0%	0.6%	0.0%	0.0%	0.6%
No Equipment to Process	Count	77	41	7	0	125
	% of Total	6.2%	3.3%	0.6%	0.0%	10.1%
Transportation	Count	15	0	8	0	23
	% of Total	1.2%	0.0%	0.6%	0.0%	1.9%
Fluctuating Price of Cassava	Count	453	245	4	3	705
	% of Total	36.7%	19.8%	0.3%	0.2%	57.0%
Total	Count	761	408	43	24	1236
	% of Total	61.6%	33.0%	3.5%	1.9%	100.0%

Source: Researcher's Analysis (2018).

Table 4.71. Impediments to cultivation of cassava among annual income groups in Comoé district

Impediments for cultivation		Annual Income from Cassava groups						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate Rainfall	Count	42	14	1	1	14	23	95
	% of Total	3.4%	1.1%	0.1%	0.1%	1.1%	1.9%	7.8%
Pests and Rodents	Count	56	10	0	21	15	0	102
	% of Total	4.6%	0.8%	0.0%	1.7%	1.2%	0.0%	8.4%
High Price of getting Cassava Stems	Count	14	0	0	1	8	7	30
	% of Total	1.1%	0.0%	0.0%	0.1%	0.7%	0.6%	2.5%
Lack of Machinery	Count	0	8	0	0	0	0	8
	% of Total	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.7%
Insufficient Manpower	Count	32	34	8	8	0	0	82
	% of Total	2.6%	2.8%	0.7%	0.7%	0.0%	0.0%	6.7%
Poor Soil Fertility	Count	1	1	0	1	0	8	11
	% of Total	0.1%	0.1%	0.0%	0.1%	0.0%	0.7%	0.9%
Lack of Arable land	Count	2	0	0	8	8	0	18
	% of Total	0.2%	0.0%	0.0%	0.7%	0.7%	0.0%	1.5%

Difficulty in getting Cassava stems	Count	8	0	0	0	0	0	8
	% of Total	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
No Equipment to Process	Count	14	11	9	3	23	66	126
	% of Total	1.1%	0.9%	0.7%	0.2%	1.9%	5.4%	10.3%
Transportation	Count	0	15	0	0	7	1	23
	% of Total	0.0%	1.2%	0.0%	0.0%	0.6%	0.1%	1.9%
Fluctuating Price of Cassava	Count	234	133	44	110	84	110	715
	% of Total	19.2%	10.9%	3.6%	9.0%	6.9%	9.0%	58.7%
Total	Count	403	226	62	153	159	215	1218
	% of Total	33.1%	18.6%	5.1%	12.6%	13.1%	17.7%	100.0%

Source: Researcher's Analysis (2018).

Table 4.72 indicates the variation of impediements to cultivation of cassava among education level groups. The results shows 688 (58.2%) respondents indicated the fluctuating price of cassava to be the major problem of cassava cultivation, of which 315 (26.6%) disclosed to have primary education; 37 (3.1%) respondents with secondary education were of the opinion that inadequate rainfall was an impediment and 8(0.7%) respondents with no primary education affirmed the lack of machinery to be a problem in cultivating cassava.

Impediments to cassava cultivation were cross tabulated among educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.74 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava cultivation across Comoé varies significantly among education given that X^2=268.227; df =30, p=0.000.

Table 4.73 shows the impediments to cultivation of cassava among number of children groups. Based on the table, 688 (57.6%) respondents indicated the fluctuating price of cassava to be the major impediment in cassava cultivation, of which 258 (21.6%) respondents had 3-5 children; 66 (5.5%) respondents with more than 5 children were of the opinion that pests and rodents were the problems faced in cassava cultivation; 8 (0.7%) respondents each with less than 3 children and no children disclosed that the lack of machinery and difficulty of getting cassava stems respectively were the problems faced in cultivating cassava.

Impediments to cultivation of cassava were cross tabulated among number of children groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.74 indicates that at a given probability level of 0.05 and confidence level of 95%, that there are significant variation of impediments to cassava cultivation among number of children (X^2=383.323; df =30, p=0.000).

Table 4.72. Impediments to cultivation of cassava among education level groups in Comoé district

Impediments to cultivation		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate Rainfall	Count	20	31	37	7	95
	% of Total	1.7%	2.6%	3.1%	0.6%	8.0%
Pests and Rodents	Count	27	47	14	21	109
	% of Total	2.3%	4.0%	1.2%	1.8%	9.2%
High Price of getting Cassava Stems	Count	0	15	15	1	31
	% of Total	0.0%	1.3%	1.3%	0.1%	2.6%
Lack of Machinery	Count	8	0	0	0	8
	% of Total	0.7%	0.0%	0.0%	0.0%	0.7%
Insufficient Manpower	Count	16	50	0	0	66
	% of Total	1.4%	4.2%	0.0%	0.0%	5.6%
Poor Soil Fertility	Count	0	10	2	0	12
	% of Total	0.0%	0.8%	0.2%	0.0%	1.0%
Lack of Arable	Count	9	8	7	0	24

land	% of Total	0.8%	0.7%	0.6%	0.0%	2.0%
Difficulty in getting Cassava stems	Count	0	0	8	0	8
	% of Total	0.0%	0.0%	0.7%	0.0%	0.7%
No Equipment to Process	Count	16	93	9	0	118
	% of Total	1.4%	7.9%	0.8%	0.0%	10.0%
Transportation	Count	7	15	1	0	23
	% of Total	0.6%	1.3%	0.1%	0.0%	1.9%
Fluctuating Price of Cassava	Count	191	315	169	13	688
	% of Total	16.2%	26.6%	14.3%	1.1%	58.2%
Total	Count	294	584	262	42	1182
	% of Total	24.9%	49.4%	22.2%	3.6%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.73. Impediments to cultivation of cassava among number of children groups in Comoé district

Impediments to cultivation		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Inadequate Rainfall	Count	1	21	50	22	94
	% of Total	0.1%	1.8%	4.2%	1.8%	7.9%
Pests and Rodents	Count	8	22	20	66	116
	% of Total	0.7%	1.8%	1.7%	5.5%	9.7%
High Price of getting Cassava Stems	Count	0	3	18	1	22
	% of Total	0.0%	0.3%	1.5%	0.1%	1.8%
Lack of Machinery	Count	8	0	0	0	8
	% of Total	0.7%	0.0%	0.0%	0.0%	0.7%
Insufficient Manpower	Count	0	9	43	30	82
	% of Total	0.0%	0.8%	3.6%	2.5%	6.9%
Poor Soil Fertility	Count	1	0	2	1	4
	% of Total	0.1%	0.0%	0.2%	0.1%	0.3%
Lack of Arable land	Count	8	1	0	16	25
	% of Total	0.7%	0.1%	0.0%	1.3%	2.1%
Difficulty in getting Cassava stems	Count	0	8	0	0	8
	% of Total	0.0%	0.7%	0.0%	0.0%	0.7%

No Equipment to Process	Count	0	29	39	57	125
	% of Total	0.0%	2.4%	3.3%	4.8%	10.5%
Transportation	Count	0	8	1	14	23
	% of Total	0.0%	0.7%	0.1%	1.2%	1.9%
Fluctuating Price of Cassava	Count	25	189	258	216	688
	% of Total	2.1%	15.8%	21.6%	18.1%	57.6%
Total	Count	51	290	431	423	1195
	% of Total	4.3%	24.3%	36.1%	35.4%	100.0%

Source: Researcher's Analysis (2018).

Table 4.74. Chi-square Result of impediments to cultivation of Cassava in Comoé District

Impediments to cultivation of cassava	District of Comoé			
	Socio-economics Characteristics	**Chi-square X^2**	**Df**	**Level of significance**
Inadequate Rainfall Pests and Rodents High Price of getting Cassava Stems Lack of Machinery Insufficient Manpower Poor Soil Fertility Insufficient Capital Lack of Arable land Difficulty in getting Cassava stems No Equipment to Process	Age	412.414	50	Varies significantly
	Sex	63.52	10	Varies significantly
	Marital status	414.827	30	Varies significantly
	Annual Income	429.776	50	Varies significantly
	Education Level	268.227	30	Varies significantly
	Number of Children	383.323	30	Varies significantly

Transportation Fluctuating Price of Cassava				

Source: Researcher's Analysis (2018).

4.7.5.2. Variation of impediments to cultivation of cassava in Lacs district

Table 4.75 indicates the impediments to cultivation of cassava across Lacs among age groups. Based on the table, 399 (39.2%) respondents indicated the fluctuating price of cassava as the main problem faced in cultivating cassava in which 86 (8.4%) respondents are in the age group 31-40 while 42 (4.1%) respondents in the age group 51-60 reported that inadequate rainfall in the region was an impediment to cassava cultivation and 1 (0.1%) respondent age >60 indicated the high price of getting cassava stem to be a problem to cultivating cassava in Lacs.

Impediments to cultivation of cassava were cross tabulated among age groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cultivation of cassava varies significantly among problems age groups of respondents across Lacs (X^2=221.999; df =60, p=0.001).

Table 4.76 presents the impediments to cultivation of cassava across Lacs between sex groups. Three hundred and nighty-nine (39.8%) of the respondents reported the fluctuating price of cassava as the major impediment faced in which 226 (22.6%) respondents were females while 86 (8.6%) male respondents indicated that pests and rodents were a problem to cassava cultivation and 1 (0.1%) male respondent indicated the lack of arable land to be an impediment.

Impediments to cassava cultivation were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cassava cultivation varies significantly between sex in Lacs distrcit given that X^2=55.660; df =12, p=0.000.

Table 4.75. Impediments to cultivation of cassava among age groups in Lacs district

Impediments to cultivation		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Inadequate Rainfall	Count	8	14	32	26	42	22	144
	% of Total	0.8%	1.4%	3.1%	2.6%	4.1%	2.2%	14.1%
Lack of Fertilizer	Count	0	0	0	0	4	0	4
	% of Total	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.4%
Pests and Rodents	Count	21	26	82	70	43	55	297
	% of Total	2.1%	2.6%	8.0%	6.9%	4.2%	5.4%	29.1%
High Price of getting Cassava Stems	Count	0	3	2	9	9	1	24
	% of Total	0.0%	0.3%	0.2%	0.9%	0.9%	0.1%	2.4%
Lack of Machinery	Count	0	1	0	7	7	0	15
	% of Total	0.0%	0.1%	0.0%	0.7%	0.7%	0.0%	1.5%
Insufficient Manpower	Count	1	2	12	15	4	3	37
	% of Total	0.1%	0.2%	1.2%	1.5%	0.4%	0.3%	3.6%
Poor Soil Fertility	Count	0	0	5	4	2	1	12
	% of Total	0.0%	0.0%	0.5%	0.4%	0.2%	0.1%	1.2%
Insufficient Capital	Count	0	7	0	1	0	0	8
	% of Total	0.0%	0.7%	0.0%	0.1%	0.0%	0.0%	0.8%
Lack of Arable land	Count	0	0	1	8	6	0	15
	% of	0.0%	0.0%	0.1%	0.8%	0.6%	0.0%	1.5%

	Total							
Difficulty in getting Cassava stems	Count	0	0	12	11	0	0	23
	% of Total	0.0%	0.0%	1.2%	1.1%	0.0%	0.0%	2.3%
No Equipment to Process	Count	1	3	6	3	2	2	17
	% of Total	0.1%	0.3%	0.6%	0.3%	0.2%	0.2%	1.7%
Transportation	Count	0	0	11	2	0	11	24
	% of Total	0.0%	0.0%	1.1%	0.2%	0.0%	1.1%	2.4%
Fluctuating Price of Cassava	Count	3	60	86	82	92	76	399
	% of Total	0.3%	5.9%	8.4%	8.0%	9.0%	7.5%	39.2%
Total	Count	34	116	249	238	211	171	1019
	% of Total	3.3%	11.4%	24.4%	23.4%	20.7%	16.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.76. Impediments to cultivation of cassava between sex groups in Lacs district

Impediments to cultivation		Sex groups		Total
		Male	Female	
Inadequate Rainfall	Count	54	90	144
	% of Total	5.4%	9.0%	14.4%
Lack of Fertilizer	Count	4	0	4
	% of Total	0.4%	0.0%	0.4%
Pests and Rodents	Count	86	194	280
	% of Total	8.6%	19.4%	27.9%
High Price of getting Cassava Stems	Count	13	11	24
	% of Total	1.3%	1.1%	2.4%
Lack of Machinery	Count	7	8	15
	% of Total	0.7%	0.8%	1.5%
Insufficient Manpower	Count	22	15	37
	% of Total	2.2%	1.5%	3.7%
Poor Soil Fertility	Count	3	9	12
	% of Total	0.3%	0.9%	1.2%
Insufficient Capital	Count	0	8	8
	% of Total	0.0%	0.8%	0.8%
Lack of Arable land	Count	1	14	15

	% of Total	0.1%	1.4%	1.5%
Difficulty in getting Cassava stems	Count	0	23	23
	% of Total	0.0%	2.3%	2.3%
No Equipment to Process	Count	7	10	17
	% of Total	0.7%	1.0%	1.7%
Transportation	Count	12	12	24
	% of Total	1.2%	1.2%	2.4%
Fluctuating Price of Cassava	Count	173	226	399
	% of Total	17.3%	22.6%	39.8%
Total	Count	382	620	1002
	% of Total	38.1%	61.9%	100.0%

Source: Researcher's Analysis (2018).

Table 4.77 shows the problems faced in cultivation of cassava among marital status groups of respondents. Based on the table, 396 (39%) respondents indicated the fluctuating price of cassava as the main problem faced in cultivation in which there were 230 (22.6%) married respondents while 148 (14.6%) single respondents reported that pests and rodents were a problem to cassava cultivation and 4 (0.4%) divorced respondents affirmed the poor soil fertility to be an impediment to the cultivation of cassava in the region.

Impediments to cassava cultivation were cross tabulated among marital status groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to cultivation of cassava among marital status across Lacs given that X^2=222.383; df =36, p=0.000.

Table 4.78 shows the impediments to cultivation of cassava among annual income groups from cassava. Based on the table, 383 (41.1%) respondents reported the fluctuating price of cassava as the major problem faced in cultivation of cassava in which 237 (25.4%) respondents earned less than 121,000FCFA annually from cassava while 144 (15.5%) respondents earning less than 121,000FCFA were of the opinion that pests and rodents were a problem to cassava cultivation and 44 (4.7%) respondents earning 161,000-180,000FCFA annually from cassava reported the fluctuating price of cassava as the problem faced.

Impediments to cassava cultivation were cross tabulated among annual income groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, that there is significant variation of impediments to cassava cultivation among annual income (X^2=318.544; df =60, p=0.000).

Table 4.77. Impediments to cultivation of cassava among marital status groups in Lacs district

Impediments to cultivation		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate Rainfall	Count	69	57	11	7	144
	% of Total	6.8%	5.6%	1.1%	0.7%	14.2%
Lack of Fertilizer	Count	0	4	0	0	4
	% of Total	0.0%	0.4%	0.0%	0.0%	0.4%
Pests and Rodents	Count	132	148	10	7	297
	% of Total	13.0%	14.6%	1.0%	0.7%	29.2%
High Price of getting Cassava Stems	Count	13	11	0	0	24
	% of Total	1.3%	1.1%	0.0%	0.0%	2.4%
Lack of Machinery	Count	9	0	6	0	15
	% of Total	0.9%	0.0%	0.6%	0.0%	1.5%
Insufficient Manpower	Count	26	10	1	0	37
	% of Total	2.6%	1.0%	0.1%	0.0%	3.6%
Poor Soil Fertility	Count	4	4	0	4	12
	% of Total	0.4%	0.4%	0.0%	0.4%	1.2%
Insufficient Capital	Count	7	1	0	0	8
	% of Total	0.7%	0.1%	0.0%	0.0%	0.8%

Lack of Arable land	Count	7	1	0	7	15
	% of Total	0.7%	0.1%	0.0%	0.7%	1.5%
Difficulty in getting Cassava stems	Count	11	12	0	0	23
	% of Total	1.1%	1.2%	0.0%	0.0%	2.3%
No Equipment to Process	Count	11	4	2	0	17
	% of Total	1.1%	0.4%	0.2%	0.0%	1.7%
Transportation	Count	12	11	1	0	24
	% of Total	1.2%	1.1%	0.1%	0.0%	2.4%
Fluctuating Price of Cassava	Count	230	146	9	11	396
	% of Total	22.6%	14.4%	0.9%	1.1%	39.0%
Total	Count	531	409	40	36	1016
	% of Total	52.3%	40.3%	3.9%	3.5%	100.0%

Source: Researcher's Analysis (2018).

Table 4.78. Impediments to cultivation of cassava among annual income groups in Lacs district

Impediments to cultivation		Annual Income from Cassava groups						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate Rainfall	Count	62	13	25	28	6	3	137
	% of Total	6.7%	1.4%	2.7%	3.0%	0.6%	0.3%	14.7%
Lack of Fertilizer	Count	4	0	0	0	0	0	4
	% of Total	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Pests and Rodents	Count	144	19	2	22	24	39	250
	% of Total	15.5 %	2.0%	0.2%	2.4%	2.6%	4.2%	26.8%
High Price of getting Cassava Stems	Count	15	2	2	1	1	3	24
	% of Total	1.6%	0.2%	0.2%	0.1%	0.1%	0.3%	2.6%
Lack of Machinery	Count	8	1	0	0	0	6	15
	% of Total	0.9%	0.1%	0.0%	0.0%	0.0%	0.6%	1.6%
Insufficient Manpower	Count	22	4	1	2	0	1	30
	% of Total	2.4%	0.4%	0.1%	0.2%	0.0%	0.1%	3.2%
Poor Soil	Count	4	1	0	1	4	1	11

Fertility	% of Total	0.4%	0.1%	0.0%	0.1%	0.4%	0.1%	1.2%
Insufficient Capital	Count	8	0	0	0	0	0	8
	% of Total	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
Lack of Arable land	Count	6	0	0	2	0	0	8
	% of Total	0.6%	0.0%	0.0%	0.2%	0.0%	0.0%	0.9%
Difficulty in getting Cassava stems	Count	23	0	0	0	0	0	23
	% of Total	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%
No Equipment to Process	Count	3	2	3	2	1	4	15
	% ofTotal	0.3%	0.2%	0.3%	0.2%	0.1%	0.4%	1.6%
Transportation	Count	0	13	0	0	11	0	24
	% of Total	0.0%	1.4%	0.0%	0.0%	1.2%	0.0%	2.6%
Fluctuating Price of Cassava	Count	237	37	5	44	28	32	383
	% Total	25.4%	4.0%	0.5%	4.7%	3.0%	3.4%	41.1%
Total	Count	536	92	38	102	75	89	932
	% Total	57.5%	9.9%	4.1%	10.9%	8.0%	9.5%	100.0%

Source: Researcher's Analysis (2018).

Impediments to cassava cultivation across Lacs district among educational level groups of respondents is presented in Table 4.79. Based on the table, 388 (39.2%) respondents reported the fluctuating price of cassava as the major impediment to cultivating cassava across Lacs, from which 225 (22.8%) respondents have no formal education of any kind while 75 (7.6%) primary school leavers indicated the problem of pests and rodents and 11 (1.1%) tertiary graduates affirmed that transportation was the problem faced in cassava cultivation across Lacs.

Impediments to cassava cultivation were cross tabulated among educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation of impediments to cultivation of cassava among education across Lacs given that X^2=264.121; df =36, p=0.000

Table 4.80 presents the impediments to cultivation of cassava among number of children groups. Based on the table, 383 (38.3%) respondents indicated fluctuating price of cassava was the major problem from which 183 (18.3%) respondents have more than 5 children while 86 (8.6%) respondents with 3-5 children reported pests and rodents was a problem and 2 (0.2%) respondents with no children indicated the lack of equipment to process cassava was an impediment to cassava cultivation.

Impediments to cassava cultivation were cross tabulated among number of children groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.81 indicates that at a given probability level of 0.05 and confidence level of 95%, indicated there is a significant variation of impediments to cultivation of cassava among number of children across Lacs given that X^2=166.585; df =36, p=0.000.

Table 4.79. Impediments to cultivation of cassava among education level groups in Lacs district

Impediments to cultivation		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate Rainfall	Count	56	45	35	1	137
	% of Total	5.7%	4.6%	3.5%	0.1%	13.9%
Lack of Fertilizer	Count	4	0	0	0	4
	% of Total	0.4%	0.0%	0.0%	0.0%	0.4%
Pests and Rodents	Count	95	75	70	49	289
	% of Total	9.6%	7.6%	7.1%	5.0%	29.2%
High Price of getting Cassava Stems	Count	10	4	10	0	24
	% of Total	1.0%	0.4%	1.0%	0.0%	2.4%
Lack of Machinery	Count	8	1	6	0	15
	% of Total	0.8%	0.1%	0.6%	0.0%	1.5%
Insufficient Manpower	Count	19	7	8	0	34
	% of Total	1.9%	0.7%	0.8%	0.0%	3.4%
Poor Soil Fertility	Count	8	3	1	0	12
	% of Total	0.8%	0.3%	0.1%	0.0%	1.2%
Insufficient Capital	Count	1	7	0	0	8
	% of	0.1%	0.7%	0.0%	0.0%	0.8%

	Total					
Lack of Arable land	Count	14	1	0	0	15
	% of Total	1.4%	0.1%	0.0%	0.0%	1.5%
Difficulty in getting Cassava stems	Count	22	0	1	0	23
	% of Total	2.2%	0.0%	0.1%	0.0%	2.3%
No Equipment to Process	Count	4	10	2	0	16
	% of Total	0.4%	1.0%	0.2%	0.0%	1.6%
Transportation	Count	0	2	11	11	24
	% of Total	0.0%	0.2%	1.1%	1.1%	2.4%
Fluctuating Price of Cassava	Count	225	107	47	9	388
	% of Total	22.8%	10.8%	4.8%	0.9%	39.2%
Total	Count	466	262	191	70	989
% of Total		47.1%	26.5%	19.3%	7.1%	100.0%

Source: Researcher's Analysis (2018).

Table 4.80. Impediments to cultivation of cassava among number of children groups in Lacs district

Impediments to cultivation		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Inadequate Rainfall	Count	18	38	30	58	144
	% of Total	1.8%	3.8%	3.0%	5.8%	14.4%
Lack of Fertilizer	Count	0	0	4	0	4
	% of Total	0.0%	0.0%	0.4%	0.0%	0.4%
Pests and Rodents	Count	26	34	86	151	297
	% of Total	2.6%	3.4%	8.6%	15.1%	29.7%
High Price of getting Cassava Stems	Count	0	2	10	11	23
	% of Total	0.0%	0.2%	1.0%	1.1%	2.3%
Lack of Machinery	Count	1	1	13	0	15
	% of Total	0.1%	0.1%	1.3%	0.0%	1.5%
Insufficient Manpower	Count	0	3	24	10	37
	% of Total	0.0%	0.3%	2.4%	1.0%	3.7%
Poor Soil Fertility	Count	0	0	8	3	11
	% of Total	0.0%	0.0%	0.8%	0.3%	1.1%
Insufficient Capital	Count	0	7	0	1	8
	% of Total	0.0%	0.7%	0.0%	0.1%	0.8%

Lack of Arable land	Count	0	0	7	8	15
	% of Total	0.0%	0.0%	0.7%	0.8%	1.5%
Difficulty in getting Cassava stems	Count	0	12	0	11	23
	% of Total	0.0%	1.2%	0.0%	1.1%	2.3%
No Equipment to Process	Count	2	4	4	7	17
	% of Total	0.2%	0.4%	0.4%	0.7%	1.7%
Transportation	Count	0	1	12	11	24
	% of Total	0.0%	0.1%	1.2%	1.1%	2.4%
Fluctuating Price of Cassava	Count	37	59	104	183	383
	% of Total	3.7%	5.9%	10.4%	18.3%	38.3%
Total	Count	84	161	302	454	1001
	% of Total	8.4%	16.1%	30.2%	45.4%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.81. Chi-square Result of impediments to cultivation of Cassava in Lacs District

<table>
<tr><th rowspan="2">Impediments to cultivation of cassava</th><th colspan="4">District of Lacs</th></tr>
<tr><th>Socio-economics Characteristics</th><th>Chi-square X^2</th><th>Df</th><th>Level of significance</th></tr>
<tr><td rowspan="6">Inadequate Rainfall
Pests and Rodents
High Price of getting Cassava Stems
Lack of Machinery
Insufficient Manpower
Poor Soil Fertility
Insufficient Capital
Lack of Arable land
Difficulty in getting Cassava stems
No Equipment to Process
Transportation
Fluctuating Price of Cassava</td><td>Age</td><td>221.999</td><td>60</td><td>Varies significantly</td></tr>
<tr><td>Sex</td><td>55.660</td><td>12</td><td>Varies significantly</td></tr>
<tr><td>Marital status</td><td>222.383</td><td>36</td><td>Varies significantly</td></tr>
<tr><td>Annual Income</td><td>318.544</td><td>60</td><td>Varies significantly</td></tr>
<tr><td>Education Level</td><td>264.121</td><td>36</td><td>Varies significantly</td></tr>
<tr><td>Number of Children</td><td>166.585</td><td>36</td><td>Varies significantly</td></tr>
</table>

Source: Researcher’s Analysis (2018).

4.7.5.3. Variation of impediments to cultivation of cassava in Lagunes district

Table 4.82 indicates the impediments to cassava cultivation across Lagunes district among age groups. 281 (27.5%) respondents indicated the lack of equipment to process cassava as the major impediment from which 93 (9.1%) are less than 21 years old while 77 (7.5%) respondents aged 41-50 claimed the lack of arable land for cassava cultivation was the problem faced; 35 (3.4%) respondents aged 51-60 reported that pest and rodents were an impediment and 1 (0.1%) respondent above 60 years indicated the inadequate rainfall in the region as the problem faced in cassava cultivation.

Impediments to cultivation of cassava were cross tabulated among age groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.88 indicates that at a given probability level of 0.05 and confidence level of 95%, that impediments to cultivation of cassava varies significantly across Lagunes among age groups given that X^2=578.492; df =55, p=0.000.

The problems faced in cultivation of cassava based between the sex groups of respondents is presented in Table 4.83. Based on the table, 281 (27.8%) respondents indicated the lack of equipment for cassava processing as the problem faced in cultivating cassava from which there were 150 (14.8%) male respondents while 93 (9.2%) female respondents reported that pests and rodents were an impediment; 154 (15.2%) male respondents affirmed the fluctuating price of cassava as a problem and 2 (0.4%) female respondents were of the opinion that transportation remains an impediment to cultivation of cassava in the region.

Impediments to cultivation of cassava were cross tabulated between sex groups of respondents to ascertain the significance of the variation. The result of the chi square test in Table 4.88 indicates that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation difference of impediments to cultivation of cassava between sex of respondents across Lagunes given that X^2=132.623; df =11, p=0.000.

Table 4.82. Impediments to cultivation of cassava among age groups in Lagunes district

Impediments to cultivation		Age groups						Total
		<21	21 - 30	31 - 40	41 - 50	51 - 60	>60	
Inadequate Rainfall	Count	10	9	10	20	26	1	76
	% of Total	1.0%	0.9%	1.0%	2.0%	2.5%	0.1%	7.5%
Pests and Rodents	Count	3	10	41	15	35	2	106
	% of Total	0.3%	1.0%	4.0%	1.5%	3.4%	0.2%	10.4%
High Price of getting Cassava Stems	Count	0	4	1	4	9	0	18
	% of Total	0.0%	0.4%	0.1%	0.4%	0.9%	0.0%	1.8%
Lack of Machinery	Count	0	0	10	2	5	0	17
	% of Total	0.0%	0.0%	1.0%	0.2%	0.5%	0.0%	1.7%
Insufficient Manpower	Count	5	10	4	26	9	0	54
	% of Total	0.5%	1.0%	0.4%	2.5%	0.9%	0.0%	5.3%
Poor Soil Fertility	Count	0	0	0	0	20	9	29
	% of Total	0.0%	0.0%	0.0%	0.0%	2.0%	0.9%	2.8%
Insufficient Capital	Count	8	0	0	0	0	0	8
	% of Total	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%
Lack of Arable land	Count	1	0	40	77	1	10	129
	% of Total	0.1%	0.0%	3.9%	7.5%	0.1%	1.0%	12.6%

Difficulty in getting Cassava stems	Count	0	0	2	11	0	0	13
	% of Total	0.0%	0.0%	0.2%	1.1%	0.0%	0.0%	1.3%
No Equipment to Process	Count	93	50	46	42	37	13	281
	% of Total	9.1%	4.9%	4.5%	4.1%	3.6%	1.3%	27.5%
Transportation	Count	0	14	1	16	1	0	32
	% of Total	0.0%	1.4%	0.1%	1.6%	0.1%	0.0%	3.1%
Fluctuating Price of Cassava	Count	32	52	54	65	20	34	257
	% of Total	3.1%	5.1%	5.3%	6.4%	2.0%	3.3%	25.2%
Total	Count	152	149	209	278	163	69	1020
	% of Total	14.9%	14.6%	20.5%	27.3%	16.0%	6.8%	100.0%

Source: Researcher's Analysis (2018).

Table 4.83. Impediments to cultivation of cassava between sex groups in Lagunes district

Impediments to cultivation		Sex groups		Total
		Male	Female	
Inadequate Rainfall	Count	31	45	76
	% of Total	3.1%	4.4%	7.5%
Pests and Rodents	Count	13	93	106
	% of Total	1.3%	9.2%	10.5%
High Price of getting Cassava Stems	Count	10	8	18
	% of Total	1.0%	0.8%	1.8%
Lack of Machinery	Count	6	11	17
	% of Total	0.6%	1.1%	1.7%
Insufficient Manpower	Count	15	38	53
	% of Total	1.5%	3.8%	5.2%
Poor Soil Fertility	Count	20	9	29
	% of Total	2.0%	0.9%	2.9%
Insufficient Capital	Count	8	0	8
	% of Total	0.8%	0.0%	0.8%
Lack of Arable land	Count	61	68	129
	% of Total	6.0%	6.7%	12.7%
Difficulty in getting Cassava stems	Count	11	2	13
	% of Total	1.1%	0.2%	1.3%
No Equipment to Process	Count	150	131	281

	% of Total	14.8%	12.9%	27.8%
Transportation	Count	30	2	32
	% of Total	3.0%	0.2%	3.2%
Fluctuating Price of Cassava	Count	154	96	250
	% of Total	15.2%	9.5%	24.7%
Total	Count	509	503	1012
	% of Total	50.3%	49.7%	100.0%

Source: Researcher's Analysis (2018).

Table 4.84 indicates the impediments to cultivation of cassava among marital status groups. Based on the problems faced in cultivating cassava, 281 (28%) respondents affirmed the lack of equipment for cassava processing as the problem faced in cultivating from which there were 160 (15.9%) single respondents while 114 (11.4%) married respondents indicated the fluctuating price of cassava as an impediment; 19 (1.9%) widowed respondents reported the lack of arable land and 1 (0.1%) divorced respondents indicated insufficient manpower as a problem faced to cassava cultivation.

Impediments to cultivation of cassava were cross tabulated among marital status groups of respondents to ascertain the sgnificance of the variation. The result of the chi square test in table 4.88 indicates that at a given probability level of 0.05 and confidence level of 95%, that there is significant variation of impediments to cassava cultivation among marital status (X^2=303.673; df =33, p=0.000).

The problems faced in cultivation of cassava with regard to the annual income groups made from cassava is presented in table 4.85. With 281 (28%) respondents indicating the lack of processing equipment for cassava from which 122 (12.2%) earned 181,000-200,000FCFA annually; 109 (10.9%) respondents earning less than 121,000FCFA annually from cassava indicated the fluctuating price of cassava as a problem while 41 (4.1%) respondents earning 141,000-160,000FCFA affirmed that pests and rodents was an impediments and 19 (1.9%) respondents earning over 201,000FCFA annually from cassava confirmed the inadequate rainfall in the region as the problem faced in cassava cultivation.

Impediments to cultivation of cassava were cross tabulated among annual income groups of respondents to ascertain the significance of the variation. The result of the chi square test in table 4.88 indicates that at a given probability level of 0.05 and confidence level of 95%, impediments to cassava cultivation across Lagunes varies significantly among annual income given that X^2=760.349; df =55, p=0.000.

Table 4.84. Impediments to cultivation of cassava among marital status groups in Lagunes district

Impediments to cultivation		Marital Status groups				Total
		Married	Single	Divorced	Widowed	
Inadequate Rainfall	Count	36	30	10	0	76
	% of Total	3.6%	3.0%	1.0%	0.0%	7.6%
Pests and Rodents	Count	60	21	14	11	106
	% of Total	6.0%	2.1%	1.4%	1.1%	10.6%
High Price of getting Cassava Stems	Count	8	1	9	0	18
	% of Total	0.8%	0.1%	0.9%	0.0%	1.8%
Lack of Machinery	Count	6	10	1	0	17
	% of Total	0.6%	1.0%	0.1%	0.0%	1.7%
Insufficient Manpower	Count	39	13	1	0	53
	% of Total	3.9%	1.3%	0.1%	0.0%	5.3%
Poor Soil Fertility	Count	20	0	0	9	29
	% of Total	2.0%	0.0%	0.0%	0.9%	2.9%
Insufficient Capital	Count	0	8	0	0	8
	% of Total	0.0%	0.8%	0.0%	0.0%	0.8%
Lack of Arable land	Count	82	28	0	19	129
	% of Total	8.2%	2.8%	0.0%	1.9%	12.8%

Difficulty in getting Cassava stems	Count	0	13	0	0	13
	% of Total	0.0%	1.3%	0.0%	0.0%	1.3%
No Equipment to Process	Count	89	160	8	24	281
	% of Total	8.9%	15.9%	0.8%	2.4%	28.0%
Transportation	Count	22	8	2	0	32
	% of Total	2.2%	0.8%	0.2%	0.0%	3.2%
Fluctuating Price of Cassava	Count	114	114	5	9	242
	% of Total	11.4%	11.4%	0.5%	0.9%	24.1%
Total	Count	476	406	50	72	1004
	% of Total	47.4%	40.4%	5.0%	7.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.85. Impediments to cultivation of cassava among annual income groups in Lagunes district

Impediments to cultivation		Annual Income from Cassava groups						Total
		<121 000 FCFA	121 000-140 000 FCFA	141 000-160 000 FCFA	161 000-180 000FCFA	181 000-200 000FCFA	>201 000FCFA	
Inadequate Rainfall	Count	42	0	7	0	8	19	76
	% of Total	4.2%	0.0%	0.7%	0.0%	0.8%	1.9%	7.6%
Pests and Rodents	Count	33	41	10	1	12	1	98
	% of Total	3.3%	4.1%	1.0%	0.1%	1.2%	0.1%	9.8%
High Price of getting Cassava Stems	Count	8	9	0	0	1	0	18
	% of Total	0.8%	0.9%	0.0%	0.0%	0.1%	0.0%	1.8%
Lack of Machinery	Count	10	0	0	0	4	3	17
	% of Total	1.0%	0.0%	0.0%	0.0%	0.4%	0.3%	1.7%
Insufficient Manpower	Count	28	3	9	1	4	9	54
	% of Total	2.8%	0.3%	0.9%	0.1%	0.4%	0.9%	5.4%
Poor Soil Fertility	Count	0	11	0	0	0	9	20
	% of Total	0.0%	1.1%	0.0%	0.0%	0.0%	0.9%	2.0%
Insufficient Capital	Count	1	0	0	0	0	7	8
	% of Total	0.1%	0.0%	0.0%	0.0%	0.0%	0.7%	0.8%

Lack of Arable land	Count	51	58	0	11	9	0	129
	% of Total	5.1%	5.8%	0.0%	1.1%	0.9%	0.0%	12.9%
Difficulty in getting Cassava stems	Count	13	0	0	0	0	0	13
	% of Total	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%
No Equipment to Process	Count	42	1	1	0	122	115	281
	% of Total	4.2%	0.1%	0.1%	0.0%	12.2%	11.5%	28.0%
Transportation	Count	0	9	17	0	5	1	32
	% of Total	0.0%	0.9%	1.7%	0.0%	0.5%	0.1%	3.2%
Fluctuating Price of Cassava	Count	109	22	11	6	50	59	257
	% of Total	10.9%	2.2%	1.1%	0.6%	5.0%	5.9%	25.6%
Total	Count	337	154	55	19	215	223	1003
	% of Total	33.6%	15.4%	5.5%	1.9%	21.4%	22.2%	100.0%

Source: Researcher's Analysis (2018).

Table 4.86 indicates the problems faced in cultivation of cassava among education level groups. Based on the table, 281 (27.8%) respondents affirming the lack of equipment to process cassava as an impediment from which 118 (11.7%) had a primary education while 91 (9%) respondents with secondary education indicated the fluctuating price of cassava as a problem; 53 (5.2%) respondents with no formal education reported the lack of arable land as an impediment and 11 (1.1%) graduates were of the opinion that fluctuating price of cassava was a problem faced in cultivating cassava.

Impediments to cultivation of cassava were cross tabulated among educational level groups of respondents to ascertain the significance of the variation. The result of the chi square test in table 4.88 indicated that at a given probability level of 0.05 and confidence level of 95%, there is a significant variation difference of impediments to cultivation of cassava among education status across Lagunes given that $X^2=129.703$; df =33, p=0.000.

Table 4.87 indicates the impediments to cassava cultivation among number of children. The problems faced in cultivation of cassava is presented in this table with 281 (28.1%) respondents confirming the lack of equipment to process as an impediment from which 87 (8.7%) respondents had 3-5 children while 74 (7.4%) respondents with more than 5 children indicated the fluctuating price of cassava as an impediment; 23 (2.3%) respondents with less than 3 children reported transportation to be a problem faced and 21 (2.1%) with no child were of the opinion that the lack of arable land was a problem to cassava cultivation.

Table 4.88 shows the result of the impediments to cassava cultivation among number of children groups. At a given probability level of 0.05 and confidence level of 95%, The result of the chi square test indicated there is a difference variation of impediments to cultivation of cassava among number of children across Lagunes given that $X^2=265.293$; df =33, p=0.000.

Table 4.86. Impediments to Cultivation of Cassava among Education Level Groups in Lagunes District

Impediments to cultivation		Education level groups				Total
		No Formal Education	Primary Education	Secondary Education	Tertiary Education	
Inadequate Rainfall	Count	20	33	23	0	76
	% of Total	2.0%	3.3%	2.3%	0.0%	7.5%
Pests and Rodents	Count	42	35	29	0	106
	% of Total	4.2%	3.5%	2.9%	0.0%	10.5%
High Price of getting Cassava Stems	Count	0	9	9	0	18
	% of Total	0.0%	0.9%	0.9%	0.0%	1.8%
Lack of Machinery	Count	0	5	12	0	17
	% of Total	0.0%	0.5%	1.2%	0.0%	1.7%
Insufficient Manpower	Count	18	13	22	0	53
	% of Total	1.8%	1.3%	2.2%	0.0%	5.2%
Poor Soil Fertility	Count	0	11	9	0	20
	% of Total	0.0%	1.1%	0.9%	0.0%	2.0%
Insufficient Capital	Count	0	1	7	0	8
	% of Total	0.0%	0.1%	0.7%	0.0%	0.8%
Lack of Arable land	Count	53	46	30	0	129
	% of Total	5.2%	4.6%	3.0%	0.0%	12.8%
Difficulty in getting Cassava stems	Count	0	11	2	0	13
	% of	0.0%	1.1%	0.2%	0.0%	1.3%

	Total					
No Equipment to Process	Count	87	118	76	0	281
	% of Total	8.6%	11.7%	7.5%	0.0%	27.8%
Transportation	Count	14	18	0	0	32
	% of Total	1.4%	1.8%	0.0%	0.0%	3.2%
Fluctuating Price of Cassava	Count	58	97	91	11	257
	% of Total	5.7%	9.6%	9.0%	1.1%	25.4%
Total	Count	292	397	310	11	1010
	% of Total	28.9%	39.3%	30.7%	1.1%	100.0%

Source: Researcher's Analysis (2018).

Table 4.87. Impediments to Cultivation of Cassava among number of Children Groups in Lagunes District

Impediments to Cultivation		Number of Children groups				Total
		None	Less than 3	3 - 5	Above 5	
Inadequate Rainfall	Count	9	6	28	26	69
	% of Total	0.9%	0.6%	2.8%	2.6%	6.9%
Pests and Rodents	Count	10	21	29	46	106
	% of Total	1.0%	2.1%	2.9%	4.6%	10.6%
High Price of getting Cassava Stems	Count	1	5	12	0	18
	% of Total	0.1%	0.5%	1.2%	0.0%	1.8%
Lack of Machinery	Count	10	0	7	0	17
	% of Total	1.0%	0.0%	0.7%	0.0%	1.7%
Insufficient Manpower	Count	0	6	22	26	54
	% of Total	0.0%	0.6%	2.2%	2.6%	5.4%
Poor Soil Fertility	Count	0	11	9	9	29
	% of Total	0.0%	1.1%	0.9%	0.9%	2.9%
Insufficient Capital	Count	8	0	0	0	8
	% of Total	0.8%	0.0%	0.0%	0.0%	0.8%
Lack of Arable land	Count	21	17	57	34	129
	% of Total	2.1%	1.7%	5.7%	3.4%	12.9%
Difficulty in getting	Count	11	2	0	0	13

Cassava stems	% of Total	1.1%	0.2%	0.0%	0.0%	1.3%
No Equipment to Process	Count	75	82	87	37	281
	% of Total	7.5%	8.2%	8.7%	3.7%	28.1%
Transportation	Count	7	23	2	0	32
	% of Total	0.7%	2.3%	0.2%	0.0%	3.2%
Fluctuating Price of Cassava	Count	56	44	71	74	245
	% of Total	5.6%	4.4%	7.1%	7.4%	24.5%
Total	Count	208	217	324	252	1001
	% of Total	20.8%	21.7%	32.4%	25.2%	100.0%

Source: Researcher’s Analysis (2018).

Table 4.88. Chi-square Result of impediments to cultivation of Cassava in Lagunes District

Impediments to cultivation of cassava	District of Lagunes			
	Socio-economics Characteristics	**Chi-square X²**	**Df**	**Level of significance**
Inadequate Rainfall Pests and Rodents High Price of getting Cassava Stems	Age	578.492	55	Varies significantly
Lack of Machinery Insufficient Manpower	Sex	132.623	11	Varies significantly
Poor Soil Fertility	Marital status	303.673	33	Varies significantly
Insufficient Capital Lack of Arable land	Annual Income	760.349	55	Varies significantly
Difficulty in getting Cassava stems No Equipment to Process	Education Level	129.703	33	Varies significantly
Transportation Fluctuating Price of Cassava	Number of Children	265.293	33	Varies significantly

Source: Researcher's Analysis (2018).

Out of the 4,000 cassava farmers, 53.7% were females. The level of adoption of cassava was very high in the Southeast corner while central area has low cassava adoption. There was a significant spatial clustering of cassava adoption in 1951-1960 (I=0.26; z=5.9); 1961-1970 (I=0.25; z=5.8);1971-1980(I=0.28;z=6.4); 2001-2010 (I=0.08;z=2.1) and pre-1951-2017 (I=0.05;z=1.3). The results obtained can be compared to the work of the authors Banowati et al, (2018). Indeed, for these authors, it is to see if the distribution model of cassava and tapioca is random, clustred or regular in Indonesia. The pattern of the distribution of tapioca production in Margoyoso Subdistrict is influenced by the existence of raw materials sources, accessibility, homophily culture that is the interaction that occurs between individuals who have similarities in views and knowledge that has strong empirical support (Rogers, 1983). Primary data analysis (2017) is known as a random pattern and is shown by the value of T 0.849 industrial location, and the position of one location is not interrelated. Margoyoso subdistrict area is located in the area or the prospective because it is easy to get clustered cassava. In line with Aidi's opinion (2000), each industry is truly independent. From this study, we can say that it gives us the factors of the spatialization of cassava and tapioca, namely production and smooth supply, distance and travel time. Before 1951, the number of cassava adopters were 53 and increased to 1422 in 2017. The number of adopters across the study area increased from pre-1951 to 2017(R^2= 0.72;F=6.2). Rogers (2003), Fagbemissi et al, (2002), Agwu et al, (2007), Obinne (1991) have partially demonstrated the temporal adoption of cassava and have mostly limited themselves to the adopters. This study furthermore highlights the temporal adoption of cassava at the village level to also follow the temporal evolution of villages in the adoption of cassava in the south-eastern part of Côte d'Ivoire.The result obseverd follow the principles stage of the theory of adoption of innovation of Rogers (1995 and 2003) and also the work of Bamire et al, (2002), Kavia et al, (2007), Muhire et al, (2014), Diaconoa, et al, (2012). According to these authors, time variable is the most significant inasmuch as it makes it possible to invalidate or validate adoption. But, what we must remember over time is that population are increasingly tempted to embrace innovation because it offers considerable advantages that can have a positive impact on people’s lives in society. And it is this economic basis that allows us to approach our analysis of the real reasons for the adoption of cassava ins south-eastern Côte d’Ivoire as follows. Cassava in southeastern Côte d'Ivoire is characterized by the reasons that motivates this adoption. These reasons were cross-referenced with socio-economic characteristics to see if they influence cassava adoption or not. This research observation is similar to Shakanye's (2017). In fact, using the logit model made it possible to determine the factors that influence the adoption of cassava. Results show cuttings accessibility, association membership, yield, crop cycle, farming experience, root size, taste, storage life, disease and pest resistance the cropping system and income are the ones that influence the adoption of cassava. From this study the income also appears in our study. However, the reasons listed in this study also contribute to the adoption of cassava. Huge financial returns (73.1%) was the major reason for cassava cultivation among farmers in the study area. But, Age: (X^2=483.061), sex: (X^2=14.861), marital status: (X^2=351.361); annuual income: (X^2=772.924), education level: (X^2=413.270) and number of children (X^2=218.604) also affected the adoption of cassava in south-eastern Côte d'Ivoire. Several authors (Daberkow and McBride 2001, Diab *et al.,* 2012, Fagbémissi, *et al.,* 2002, Fountas, *et al.,* 2005 and Adesina, *et al.,* 2000) have written on the problems encountered in the adoption of cassava. These problems are varied and depend to a large extent on the social characteristics of the populations. According to Diab (2012) high price of fertilizers, its unavailability and high shelling of grains were the most important barriers to the adoption and dissemination of wheat seeds. Lack of farmer's experience and lack of extension activities, lack of labour, absence of money, type of soil, lack and late arrival of transportation. These problems are as similar as those encountered in the adoption of cassava cultivation presented in this study. According to FAO (2012), the question of the condition of cassava is of paramount importance. Cassava is a perishable food crop as a whole and so it is right that people should develop cassava storing and conservation techniques with government support. Finally, the last problem in the cultivation of cassava that respondents encounter is lack of fertilizer. This problem is only visible in the Lacs district. On the other hand, it is totally non-existent in the other districts. The impediments to cassava adoption is widespread across the study area while impediments to cassava cultivation such as fluctuating price of cassava, pests and rodents, and no equipment to process cassava are uniform across the districts.

CHAPTER FIVE / SUMMARY AND CONCLUSION

5.1. Introduction

This chapter provides the highlight and conclusions on the study on spatio-temporal pattern of adoption and cultivation of cassava in south-eastern Côte d'Ivoire. Also, recommendation were made from the study to improve the adoption and cultivation of cassava.

5.2. Summary

The aim of this study was to examine the spatio-temporal pattern of adoption and cultivation of cassava in south-eastern Côte d'Ivoire. The specific objectives; to examine the spatial pattern of adoption of cassava cultivation, to analyse the temporal pattern of adoption of cassava cultivation, to analyse the variation of the reasons for the adoption of cassava among socio-economic groups and to examine the spatial variation of the impediments to adoption and cultivation of cassava. In order to achieve the set objectives, four tested hypotheses aided in achieving the set aim.

The hypotheses generated examined the spatial pattern of cassava adoption, the number of people adopting cassava varied significantly among the years, the reasons for adoption of cassava vary significantly among socio-economic groups, the impediments to cassava adoption varied significantly among the districts and the impediments to cassava cultivation varied significantly among the districts.

The analysis conducted for all the years considered in this study to ascertain the model of the disribution of spatial pattern of adoption of cassava in the study area. Based on the year of adoption as reported by the respondent during the questionnaire survey revealed a clustered pattern for four set of years and a random pattern for the others.

From the above, the following classes of years 2011 and 2017, 1991 and 2000, 1981 and 1990 and before 1950 attested a random spatial pattern of cassava adoption.

The remaining classes of years 2001 and 2010, 1971 and 1980, 1961 and 1970, and 1951 and 1960 revealed a clustered spatial pattern of adoption of cassava. Furthermore, the same analysis was conducted for the year in concert, in other words from before 1951 and 2017. The overall spatial pattern that was observed was random.

This observation may be attributed to the dichotomy that might have occurred in the pattern recorded for the individual class of years. Hence, the hypothesis was treated based on the individual class of years considered in this study as well as the whole length of years considered in the study.

The variation in the number of adopters among the years (pre -1951 to 2017) was also tested. The number of adopters varied significantly over the years. The possible reason inferred as observed from the responses given by the respondents showed there was an increase in the number of adopters with every change in the year of study.

The trend analysis which was conducted sequel to the One-Way Analysis of Variance. The trend analysis revealed that there was a rising trend and it is expected to continue till it attains the peak and then normalizes. Furthermore, the same trend analysis was carried out at the district level across the three selected districts of study within the study area (South-eastern Côte d'Ivoire).

The same conclusion recorded for the trend analysis conducted for the years was also recorded for the three districts, thus the trend of cassava adoption is expected to rise across the three districts. In other words, the number of adopters is expected to be on the rise and in the nearest future achieve a peak and then normalize.

The socio-economic characteristics of respondents in the study area, showing the proportion and categories into which respondents belong in terms of the selected socio-economic characteristics, these were; age, sex, annual income from cassava, number of children, educational level and marital status of respondents. The proportion was presented using appropriate charts and tables. Furthermore, the variation for the adoption of cassava and the socio-economic characteristics was examined with the aid of the cross-tabulation techniques followed by a Pearson Chi Square test of relationship. A significant relationship exists between the reasons of adoption of cassava and the socio-economics characteristics of respondents. Hence, it was inferred that the socio-economic characteristics of respondents had a significant influence on their choice to adopt cassava. Only four (marital status, income, educational level and number of children) of the selected socio-economic characteristics exerted significant influence on the reasons of adoption of cassava while the remaining two (age and sex) do not.

Finally, the variation of reasons of adoption of cassava was examined at a district level with the aid of the One-way Analysis of Variance which showed that the reasons identified from the responses given by respondents vary significantly across the three districts (Comoe, Lacs and Lagunes) considered in this study.

The variation of impediments to adoption of cassava was examined across the study area using the three districts in the study area as a unit of analysis. The One-way Analysis of Variance showed that the reasons identified from the responses given by respondents do not vary significantly across the three districts (Comoe, Lacs and Lagunes) considered in this study.

The variation of impediments to cultivation of cassava was examined across the study area using the three districts in the study area as a unit of analysis. The One-way Analysis of Variance showed that the reasons identified from the responses given by respondents vary significantly across the three districts (Comoe, Lacs and Lagunes) considered in this study.

The variation between the impediments to adoption of cassava and the socio-economic characteristics which were carried out with the aid of the cross-tabulation techniques followed by a Pearson Chi-Square test of relationship. No significant relationship exists between the impediments to adoption of cassava and the socio-economic characteristics of respondents. Hence, the socio-economic characteristics of respondents do not have a significant influence on the impediments respondents face when adopting cassava. Furthermore, the variation between the impediments to cassava cultivation and the socio-economic characteristics was executed with the aid of the Cross-tabulation techniques followed by a Pearson Chi-Square test of a relationship. A significant relationship exists between the impediments to cultivation of cassava and socio-economic characteristics of respondents. Hence, the socio-economic characteristics of respondents have a significant influence on the various impediments respondents face when cultivating cassava.

5.3. Findings

Over 53.0% of the cassava farmers were females, 25.6% were aged between 31 and 40 years, 53.3% were married, 37.7% had primary education, 32.9% had more than five children, and 39.1% earned <121.000 FCFA (220 USD). There was significant clustering of villages adopting cassava in1951-1960(I=0.26;z=5.9); 1961-1970(I=0.25;z=5.8);1971-1980(I=0.28;z=6.4); 2001- 2010(I=0.08;z=2.1) and the entire period 1951-2017(I=0.05;z=1.3). The number of individuals who have adopted cassava was only 53 before1951 but increased to 1422 in 2017. The number of adopters increased significantly from 1951 to 2017(R^2= 0.72;F=6.2). Adoption of cassava in the districts was significantly influenced by: age (X^2=483.061), sex (X^2=14.861), marital status(X^2=351.361) annual income (X^2=772.924), educational level (X^2=413.270) and number of children (X^2=218.604). In Comoé district, annual income (X^2=313.499); educational level (X^2=237.131) and number of children (X^2=71.012) were significantly related to cassava adoption, whereas in Lacs district, annual income (X^2=302.581); educational level (X^2=299.157) and number of children. (X^2=256.511) were the significant variables. In Lagunes district, annual income (X^2=525.926); educational level (X^2=105.192) and number of children (X^2=151.538) significantly influenced cassava adoption. Financial returns (73.1%) was the major reason for cassava adoption by farmers. The impediments to adoption of cassava in the districts are inadequate rainfall, no training on cassava, difficulty in getting stems, lack of capital and lack of labour.

There was widespread adoption of cassava in southeastern Côte d'Ivoire. Financial gain and food consumption are major reason for the adoption of cassava. More farmers should be encouraged to adopt and cultivate cassava given its role in food security and income generation in the country.

5.4. Conclusion

Côte d'Ivoire has given priority to the development of industrial crops and annuity (coffee, cocoa, oil palm, coconut, rubber, cotton, sugar cane, etc) in the early years of her independence and to a greater extent than the food crops. But in recent years, the needs have risen for food crops in order to reduce its dependence on imported food hence, cassava is one of the staple foods as for the rural population, they stop to change, to adapt, to innovate and specifically to learn in order to satisfy their daily well-being.

The study examined the spatial and temporal pattern of adoption and cultivation of cassava in south-eastern Côte d'Ivoire. This has been essential to the extent it was noted that adoption of cassava in Africa and especially in the south-eastern of Côte d'Ivoire has become an increasingly remarkable activity growing in space and time, sparking more interest on the part of rural and urban populations.

Food agriculture being the main activity of rural population, to carry out this reflection and check the assumptions made, surveys were conducted on the actors of the food chain in case the producers of cassava. Parallel interviews had been brought to enrich the data collected through field investigations.

The analytical framework of the study were based on the model of adoption-diffusion-space-time. Specifically, this study was designed to examine the spatial pattern of cassava adoption, to analyze the temporal pattern of cassava cultivation, to analyse the socio-economic determinants of the adoption of cassava cultivation and finally examine the impediments to adoption and cassava cultivation.

Cassava has received special attention from the state. According to the Ivorian Ministry of Agriculture (2017), cassava ranks second to the level of food production after yam. It is more consumed and occupies a place of choice to Ivorian dietary habits especially as a result of its importance to economic profitability level.

The urbanization of African cities is increasingly evolving. It is for this reason that the World Bank's report in 2017 says that the urban population in Africa currently amounts to 472 million inhabitants, but this population will double over the next 25years to reach a billion inhabitants in 2040.

This report is also noticeable in Côte d'Ivoire with a rate of urbanization of 49.7% in 2014 (RGPH, 2014). Rural areas produce food in sufficient quantity to feed the city especially since in Côte d'Ivoire the rural population is the majority with 50.3% is 11,394,685 inhabitants (RGPH, 2014) and is a considerable factor justifying the adoption and cultivation of cassava, especially in the south-eastern Côte d'Ivoire.

The urban population, therefore is an important consumer market for food products which in this case is cassava for farmers. Thus, the city presents opportunities encouraging the adoption of cassava the crops rears in the rural populations in the study area are cassava, which is the main agricultural activity. Sometimes, the non-peasants who practice the cultivation of cassava to diversify their sources of income, these factors combined with natural and human conditions play a significant role in the adoption and the cultivation of cassava. Indeed, the cassava is a less demanding plant compared to export crops. With the phenomenon of increased and perceptible climate change in Côte d'Ivoire, affecting mostly climate variability and increasingly poor soils, rural populations have to move towards a crop (cassava) that can adapt to the current climate conditions of the country at the same time, the quantities of water required for good plant growth have become less available since 1970.

The risks of crop loss are becoming greater, especially for food crops with a long vegetative cycle (more than 120 days) and perennial crops such as cocoa, coffee and oil palm (ANADER, 2016) are undergoing changes in weather patterns because of low water levels. This is more noticeable towards the northen of the area of study than in the South where there is still dense forest vegetation. Compared to the North, where the rainfall became unimodal and low annual rainfall heights has emerged as the most uncertain and vulnerable area to climate change. In these conditions, rural people can only practice a less demanding culture and adapt to these conditions, namely the cultivation of cassava.

The crop calendar is becoming more stable than before and there is dependent on the adoption of cassava. Alongside climate effects, access to the land became difficult because of the saturation of land still very favourable to agriculture towards south of the study area (southern part of the Lagunes district, and the district of Comoé). Populations from other regions of Côte d'Ivoire and neighbouring countries (Ghana and Burkina-faso) in search of suitable land for export crops face local populations and chieftainship because they do not want to practice this so-called "income-producing" agriculture rather they favour cassava cultivation because they believe this plant represents *"white gold"* or its adoption in the south-eastern Côte d'Ivoire.

This transition from subsistence agriculture to commercial food (cassava) reflects the adoption and cultivation of cassava with a new orientation in production. The consultation of the adoption literature and cultivation of cassava allowed us to understand the stages of adoption, the cultivation of cassava with the support of the basic theories reinforcing the perception of the author on the adoption and the cultivation of cassava. However, the consulted authors have left us very perplexed and dissatisfied because emphasis has not really been placed on the spatial pattern of adoption of cassava cultivation, as well as on the temporal pattern of cassava cultivation; rather on the socio-economic determinants of adoption of cassava cultivation and the major problems of adoption of cassava cultivation. This reflection deals with the above elements justifying the adoption and culture of cassava in the south-eastern Côte d'Ivoire.

5.5. Comtribution to knowlege

This study on spatio-temporal patterns of adoption of cassava allow us to understand firstly the cassava adoption and secondly te reasons of its adoption. Based on the literature until now, we really don’t have enough study relating on spatial and temporal patterns on cassava. Through this, there will be tracebaility on cassava in time ans space and, we know the factors influencing this adoption of cassava.

This study is really important for several reasons; indeed, the study use modern techniques and methods to provide useful information for future studies and other area of research. In addaition, it provides a temporal database of villages adopting cassava before 1951 to 2017. This database is beneficial for Africa because it aids to understand the different steps on adoption and gives recommendations for a perfect diffusion. Finally, in line with one of the FAO resolution to overcome the global food crisis, this study will be an essential guide for decision-makers in food policy and poverty reduction, spatial organisation and dissemination of food crops.

5.6. Recommendations

The recommendations proposed in this study on the spatio-temporal pattern of adoption and cassava cultivation in south-eastern Côte d'Ivoire are essentially the responsibility of the public authorities, cooperatives, and also the farmers.

In view of the difficulties encountered in the adoption and cultivation of cassava, which was extensively detailed in this study, we advocate that a proactive policy is essential from the leaders of Côte d'Ivoire for the effective implementation of the political intentions declared for several years for the improvement of the conditions of the rural environment. In fact, it is in these conditions that the recommendations made could contribute to finding solutions to the problems of adoption and cassava cultivation.

These research prospects are numerous in a sector where much are to be done, particularly in the field of infrastructure, trade and especially in the control of post-harvest activities. Indeed, the cassava root is a heavy product once harvested, it does not stay long as a result, it is therefore impossible to build stock markets in urban markets and this contributes to the creation of a seasonal shortage situation in Côte d'Ivoire in general and in the south-east of Côte d'Ivoire in specific.

The recommendations made here stem from the wishes of the producers of cassava. It comes from the constraints identified above. These can only be positive when accompanied by a strong political will that can bring about essential changes in the adoption and cultivation of cassava in south-eastern Côte d'Ivoire because in the end it is political leaders that bear the greatest responsibility for the effective implementation of the recommendations made;

The funding problem was one of the major issues during the field survey in the study area. This problem is different for producers and traders because they all use their own funds to start their activities. However, the focus here is on cassava producers for adopters, the funding problem is acute. Indeed, microfinance and banks are not yet ready to finance farmers producing food crops given the risks (natural and human). It is in this context that state intervention is necessary to encourage the establishment of much more specialized credit institutions for farmers who sole production is cassava.

The establishment of banking institutions specializing in the financing of food crops, such as cassava, requires strong state involvement. With regard to management measures and the mobilization of public funds, it is here that the political will of the public authorities is solicited to change their perspective on subsistence agriculture and specifically cassava which in the future constitute a culture throughout Africa.

Nevertheless, beyond banking institutions, cash flow difficulties can also be solved by introducing, alongside the practice of growing cassava, food crops with a cycle cost (tomato, garden egg ...), which are much more rewarding. However, these measures must be framed in such a way as to avoid the abandonment of cassava for the benefit of these crops, which would probably have consequences for food security, especially at the level of the pillar on the availability and cost of products (cassava).

Agriculture, is the dominant primary sector in rural Côte d'Ivoire. This economic activity occupies 70% of the active population Recensement National des Agriculteurs (RNA, 2001). However, the paradox is that the rural population is the most deprived, it therefore seems important to find new strategies for reducing poverty in rural areas. Therefore, to get out of this situation of financial precariousness characterizing the producers, they must become more professional. Indeed, they will be considered as professionals when they will be able to work in good conditions and survive from their work. Therefore, they have to move away from subsistence, traditional subsistence agriculture towards a profitable subsistence farming with the use of modern and adapted tools. This transition can only be executed through cooperatives and associations as the Ediakro village (District of Lacs). In this village, the professionalism of the cassava producers is reflected in the modern use of modern production techniques on one hand and on the other hand, the training, enthusiasm, and involvement in this activity. The involvement of political authorities in the process of professionalization of producers should result in the design and implementation of a policy encouraging agricultural entrepreneurship: a wealth creation situation, a regulation, and a financing system adapted to this new type of entrepreneur (peasant-innovator).

The absence of associations and sometimes unregulated farmers producing cassava allowing actors to carry out actions together represents a handicap in the adoption and cultivation of cassava in the study area. The lack of association is a constraint for cassava cultivation, especially for farmers, who are much more vulnerable and unable to find solutions to certain problems that can only be solved collectively. It is therefore important for farmers to understand the legitimacy of cooperatives and peasant associations in this case, the role of the state should be limited to stimulating and encouraging such initiatives through supervision. For example, we have the rural group work "tontine de travail" which must be developed because, in addition to allowing the production of cassava, these activities consolidate the relations between the farmers.

The state is called to sit in intervention on the success of local experiences in order to capitalize on the achievements. These training can be organized by the State services and also by development partners operating in rural areas. In addition, the farmers can setup a cassava development council in each district which will be a consultation body on which the cooperatives and local associations can refer to get the point of view of the farmers and also to carry out the pricing. If this development council is solid, the local farmers' organizations will benefit from the supervision. This body would thus strengthen farmers' position and their bargaining power vis-à-vis other actors in the agricultural sector, which would help improve their performance.

- Solution for better marketing of food crops in South-eastern Côte d'Ivoire

The deterioration of roads and the absence of specialized transport vehicles in south-eastern Côte d'Ivoire obviously justify the high cost of transport and the inefficiency of the marketing system. Supply areas are becoming increasingly isolated due to poor road conditions. The authorities have the responsibility and even the obligation to rehabilitate the road network.The farmers have to exploit the train for the evacuation of food products. But, given the bad roads, cassava cannot be easily transported to the railway station. This is why the rehabilitation of roadways is essential despite this, there are a dynamic rehabilitation and maintenance of the road network underway in the study area that deserves to be welcomed and continued.

The food crops are mostly perishable therefore, there is a need for storage facilities and conditioning after harvest. This is one of the parameters to prone more efficient marketing especially in conservation and storage facilities which require significant investments on infrastructure to maintain the quality of the products.

For this purpose, there should be an installation of storage infrastructure modernised to ensure conservation of the products. These infrastructures must be put in place in rural area as well as in urban areas thus, in the rural area these facilities can act as the center of backing up. From investigations, apart from cassava, farmers do not have the ability to transform other food crops. The transformation is a technique that can be developed or upgraded because it also allows the conservation of the food over a long period. Therefore, the state encourages schools, universities and research centers to work with farmers to teach them the techniques of processing as a means of adding value to their crops, thus, to achieve this research institutions must orient research work in order to have an impact on the activities of the peasants.

The Market Information System is crucial in the marketing of cassava. The ideal market is one in which supply and demand are balanced and transaction prices are known everywhere. A well-organized market can help achieve the ideal through information on prices, marketed quantities and trends according to Goossens *et al.,* (1994) cassava growers in the study area use a traditional information system for cassava marketing.

This system is "word of mouth" is a kind of dissemination of information but traditional indeed, this system has limits in that the authenticity of the information varies from one person to another and especially according to the relationship between the information holder and the requester, because this sector is an area where competition and "rivalries" exist. For this reason, it is necessary to set up capital and formal information system for cassava producers without losing sight of the fact that the valuation of information will depend heavily on the recommendations related to infrastructure and transport.

There are some initiatives like Office d'Aide à la Commercalisation des Produits Vivriers (OCPV) that collect and publish food prices in the study area. However, this activity as any process experiences difficulties and this initiative needs to be consolidated and expanded in all the districts of Côte d'Ivoire so that the information collected and published is available to producers who wish. In addition, it is the responsibility of the public authorities to implement this Market Information System (MIS) that benefit all actors in the food chain. This MIS thus is to disseminate the various information on the markets for the supply and sale of food crops, especially cassava through the media this system can be attached to the INS to provide basic information. Thus, it improves the efficient distribution of cassava throughout Côte d'Ivoire.

Finally, the study examined the spatio-temporal pattern of adoption of cassava cultivation in south-eastern Côte d'Ivoire like any process, the adoption, and cultivation of cassava encounters constraints. To achieve sustainable food security, recommendations were made for the full adoption of cassava cultivation in the study area. Beyond the spatial occupation of cassava, the issue of environmental degradation arises in south-eastern Côte d'Ivoire. Indeed, the methods and techniques of field creation remain dominated largely by the manual mode. As this mode tries to achieve food self-sufficiency, it is essential to go through the production of food. The questions here therefore is how to achieve food self-sufficiency while protecting the environment.

5.7. Future Research Area

Food shortages have become a permanant problem in most developping tropical countries as a result of lack of availability of arable land, problem of urbanisation, deforestation, food security and poor soil. In most of these countries attempts by governments, local extension workers and non-gouvernmental organisation through importation of food for subsitdy among others have been unable to tackle the problems properly. This is due to inadequate information on adoption and cultivation of cassava management.

The missing link is lack of holistic approach that involves the peasant farmers themselves. Reform agenda can only be useful when it considers the way the peasant farmers percieved adoption. The following areas pertaining adoption of cassava are yet to be adequately researched.

- Historical dynamics of cassava adoption and the role of socio-economic proccesses in the social and environmental transformation
- Differential pattern of cassava management over space and time
- Economic, Institutional and technical constraints of adoption of cassava
- Spatial agricultural mutation of cassava adoption and appropriate diffusion model
- Impacts and social transformations of cassava cultivation in rural development
- Benefits of adoption of cassava in achieving food-security in developping countries.

Future research study similar to the present work reported in this study should be carried out under cassava and other food crops and the differents location area, especially in northen part of Côte d'Ivoire using others methods or method used in the study. This will be provid a framework for more understanding of the findings in the study, particularly food crops- food security relationship and sustainability of production.

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APPENDIX I

QUESTIONNAIRE ON THE ADOPTION AND CULTIVATIONOF CASSAVA

(FOR CASSAVA FARMERS)

Name of the village / Town

……………………………………………………………………

Age:

Region of origin:………………………………..

Sex: Male ☐ Female ☐

Marital status: Married ☐ single ☐

Ethnic group: ………..

Divorced ☐ widowed ☐

Income: …………………………F CFA

Education: No Formal Education ☐ Primary educa☐ Seco☐ry

Higher education ☐

Number of children: None ☐ Less than 3 ☐ 3-5 ☐ above 5 ☐

1- When did you start cassava cultivation?

Before 1950 ☐ 1951- 1960 ☐ 1961-1970 ☐ 1971-1980 ☐

1981-1990 ☐ 1991-2000 ☐ 2001-2010 ☐ 2011-2017 ☐

2- Why do you cultivate cassava?

....

………………………………………………………………………………

………………………………………………………………………………

…………

3- Did anyone introduce you to cassava cultivation? Yes ☐ No ☐

4- If yes, who introduce you to cassava cultivation?

....

………………………………………………………………………………

……..

5- If yes, did the people who introduce you to cultivation give you any farm to cultivate?

Yes ☐ No ☐

6- If yes, what type of assistance? ....

……………………………………………………………………………………….

7- Do you usually get assistance from:

A: cassava association Yes ☐ No ☐

B: government Yes ☐ No ☐

C: any others (specify): ……………………………………………….

8- If you get assistance from any of the groups in indicated in question 7, what type of assistance do you get?

GROUP	TYPE OF ASSISTANCE
Cassava association	
Government	
Others	

9- How large is your farm land (number of cassava stand)

10- How did you acquire this land?

By purchase ☐ Inheritance ☐ Gift ☐ Lease ☐

11- Are you the only one provided labour on your farm? Yes ☐ No ☐

12- If No, what type of labour assist you on your farm?

Family ☐ Foreign ☐ Village association ☐

13- Did you face any problem in adopting cassava as your farm crop ☐ Yes No

14- If yes, what problems did you face in adopting cassava as a farm crop?.....................

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………….

15- Do you face any problem in the cultivation of cassava Yes No

16- If yes, what problem did you face?...
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
………………

17- As part from cassava, do you cultivate others crops? Yes No

18- If Yes, what others crops do you cultivate?..
…………………………………………………………………………………………
…………………………………………………………………………………………
…………..

19- If Yes, which is/are the most important crop(s) that you farm?

a- Cassava Yes No

b- Others (specify)
………………………………………………………….

20- What is responsible for the choice of the most important crop(s)?
....
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
………………

QUESTIONNAIRE ON THE ADOPTION AND CULTIVATION OF CASSAVA

(FOR EXECUTIVE OF CASSAVA ASSOCIATION)

Name of the village:…………………………………………………………

Name of the association:………………………………………………………

Year of association founding:………………………………………………………

Number of person involved in association:……………………………………………

Status of association: Register ☐ Non-register ☐

1- What year was cassava introduced for the first time in the village?......................
2- Who introduced cassava in this village? ....
3- Can we have the exact date when the village adopted cassava cultivation since its introduction in this village?...
4- If not, Why?.. ………………………………………………………………………………… ……….
5- What are the majors factors taking part in the adoption of cassava in this village?........ ………………………………………………………………………………… ………………………………………………………………………………… ……………….
6- Which is the majority gender in the adoption of cassava in this village?
   Male ☐ Female ☐
7- Why this Gender?..

……………………………………………………………………………………
……………………………………………………………………………………
………………..

8- Which is the majority ethnic group in the adoption of cassava cultivation in the village?...
....

9- Why this ethnic group?...
……………………………………………………………………………………
……….

10- Do all the village adopt cassava cultivation? Yes ☐ No ☐

11- If No, which percentage? 0-30 ☐ 30-60 ☐ 60-90 ☐

12- What are the strategies for the total diffusion of cassava in the village?........................
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
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13- What are the functions/roles of the cassava association for the farmers in the adoption of cassava?
…..
....
....
....

14- Is there any advantage to the farmers involved in cassava association in the village?

Yes ☐ ☐No

15- If yes, what
advantages?...
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
………………………

16- Can you estimate the cassava production tonne in the village per year since its adoption?

0-1 t ☐ 1-2t ☐ 2-3 t ☐ More than 3 ☐

17- What are the problems faced by the association in cassava diffusion in the village?
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………

APPENDIX II

Frequency Tables

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<21	222	5.6	5.6	5.6
	21 - 30	598	15.0	15.0	20.5
	31 - 40	1024	25.6	25.7	46.2
	41 - 50	959	24.0	24.0	70.2
	51 - 60	758	19.0	19.0	89.2
	>60	431	10.8	10.8	100.0
	Total	3992	99.8	100.0	
Missing	System	8	.2		
Total		4000	100.0		

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	1836	45.9	46.3	46.3
	Female	2130	53.3	53.7	100.0
	Total	3966	99.2	100.0	
Missing	System	34	.9		

Total	4000	100.0		

Village

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Abeve	30	.8	.8	.8
	Abigui A	26	.7	.7	1.4
	Abigui B	25	.6	.6	2.0
	Aboisso	27	.7	.7	2.7
	Abongoua	30	.8	.8	3.5
	Abradimou	27	.7	.7	4.1
	Abrokakro	25	.6	.6	4.8
	Aby	30	.8	.8	5.5
	Aby-Mohoua	27	.7	.7	6.2
	Adaou	25	.6	.6	6.8
	Adiake	40	1.0	1.0	7.8
	Adjame	29	.7	.7	8.5
	Adjouan	27	.7	.7	9.2
	Affienou	30	.8	.8	10.0
	Agba-Bayasou	28	.7	.7	10.7
	Ahounianssou	24	.6	.6	11.3
	Ahua	26	.7	.7	11.9
	Akainougbe	30	.8	.8	12.7

Akalekro	27	.7	.7	13.3
Akoupe	34	.9	.9	14.2
Akoure	21	.5	.5	14.7
Akpoue-Boue	29	.7	.7	15.4
Akroaba-Akoudjekoa	31	.8	.8	16.2
Alepe	33	.8	.8	17.0
Aman Salekro B	20	.5	.5	17.5
Aman-Salekro	25	.6	.6	18.2
Amangbeu	21	.5	.5	18.7
Amanikro	30	.8	.8	19.4
Amoibro	28	.7	.7	20.1
Amoukro	26	.7	.7	20.8
Andou-M'Batto	25	.6	.6	21.4
Anze-Assahoun	27	.7	.7	22.1
Assa-Comekro	29	.7	.7	22.8
Assakro	27	.7	.7	23.5
Assebokro	25	.6	.6	24.1
Assikasso	27	.7	.7	24.8
Assoakro	30	.8	.8	25.5
Assokro 1&2	33	.8	.8	26.4
Assouakro	29	.7	.7	27.1
Assouba	24	.6	.6	27.7
Attiekro	24	.6	.6	28.3

Attingue	31	.8	.8	29.1
Ayame	28	.7	.7	29.8
Bakanou A	25	.6	.6	30.4
Banabo	27	.7	.7	31.1
Bangokro	24	.6	.6	31.7
Batera	28	.7	.7	32.4
Becedi	34	.9	.9	33.2
Becoufin	30	.8	.8	34.0
Bettie	30	.8	.8	34.7
Blekoum	22	.6	.6	35.3
Bocanda	27	.7	.7	35.9
Bodo	27	.7	.7	36.6
Bonoua	28	.7	.7	37.3
Bouaffoukro	26	.7	.7	38.0
Brindoukro	57	1.4	1.4	39.4
Broubrou	26	.7	.7	40.0
Broukro	26	.7	.7	40.7
Dabou	33	.8	.8	41.5
Dame	27	.7	.7	42.2
Danguira	22	.6	.6	42.7
Daoukro	33	.8	.8	43.6
Diangobo	49	1.2	1.2	44.8
Didievi	24	.6	.6	45.4

Dimbokro	28	.7	.7	46.1
Djemissikro	24	.6	.6	46.7
Djimini-Kottikro	26	.7	.7	47.3
Ebakro	24	.6	.6	47.9
Ebilassokro	28	.7	.7	48.6
Ebokro	30	.8	.8	49.4
Ebonda	30	.8	.8	50.1
Eboue	30	.8	.8	50.9
Elima	30	.8	.8	51.6
Eltania V1-V4	30	.8	.8	52.4
Ettieukro	22	.6	.6	52.9
Etubety	28	.7	.7	53.6
Etueboue	30	.8	.8	54.4
Frambo	22	.6	.6	54.9
Gamon	22	.6	.6	55.5
Gbougbo	25	.6	.6	56.1
Goli	30	.8	.8	56.9
Grand-Jack	24	.6	.6	57.5
Grand-Moutcho	23	.6	.6	58.0
Kanga-Nianze	27	.7	.7	58.7
Kassasso	20	.5	.5	59.2
Kassiguie	26	.7	.7	59.9
Katadji	25	.6	.6	60.5

Katieplinou	27	.7	.7	61.2
Kodi	28	.7	.7	61.9
Koffi-Amoukro	30	.8	.8	62.6
Koltikorekro	24	.6	.6	63.2
Kotouagnoua	24	.6	.6	63.8
Kouakro	25	.6	.6	64.4
Kouassi Kpekro	24	.6	.6	65.0
Kouassi-Kouassikro	25	.6	.6	65.7
Krokrokro	25	.6	.6	66.3
Larabina	27	.7	.7	67.0
M'Bahiakro	25	.6	.6	67.6
M'Bouacessou	26	.7	.7	68.2
M'Braty	30	.8	.8	69.0
Mafere	30	.8	.8	69.7
Medina	27	.7	.7	70.4
Montezo	20	.5	.5	70.9
Mopoyem	24	.6	.6	71.5
Morokro	28	.7	.7	72.2
Motobe	25	.6	.6	72.8
Mouyossue	23	.6	.6	73.4
N'Da-broukro	28	.7	.7	74.1
N'Douci	29	.7	.7	74.8
N'Drikro	52	1.3	1.3	76.1

N'Gberenou	30	.8	.8	76.9
N'Gokro	49	1.2	1.2	78.1
N'Gouanda	30	.8	.8	78.9
N'Gramassabo	25	.6	.6	79.5
N'Zecrezessou	25	.6	.6	80.1
Niable	27	.7	.7	80.8
Nianda	46	1.2	1.2	81.9
Noe	20	.5	.5	82.4
Nyan	19	.5	.5	82.9
Nzi-Nziblekro	28	.7	.7	83.6
Oghlwapo	22	.6	.6	84.2
Oguiedoume	30	.8	.8	84.9
Oren-Krobou	26	.7	.7	85.6
Prikro	35	.9	.9	86.4
Saibe	22	.6	.6	87.0
Sakro	25	.6	.6	87.6
Salebalekro	26	.7	.7	88.3
Samo	27	.7	.7	88.9
Saykro	26	.7	.7	89.6
Sodefor Mopri	28	.7	.7	90.3
Songon	28	.7	.7	91.0
Tangoumaussou	25	.6	.6	91.6
Tanguelan	25	.6	.6	92.2

Tanosso	27	.7	.7	92.9
Tiebissou	28	.7	.7	93.6
Tiemelekro	26	.7	.7	94.3
Toto-Kouassikro	25	.6	.6	94.9
Trianikro	26	.7	.7	95.5
Tromabo	25	.6	.6	96.2
Vieux-Badren	23	.6	.6	96.7
Yaou	30	.8	.8	97.5
Yapokoi	26	.7	.7	98.1
Yassap A	24	.6	.6	98.7
Yassap B	24	.6	.6	99.3
Zamaka	27	.7	.7	100.0
Total	4000	100.0	100.0	

Marital Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	2131	53.3	54.2	54.2
	Single	1450	36.3	36.9	91.0
	Divorced	166	4.2	4.2	95.2
	Widowed	187	4.7	4.8	100.0
	Total	3934	98.4	100.0	
Missing	System	66	1.7		
Total		4000	100.0		

Annual Income from Cassava

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<121 000 FCFA	1564	39.1	41.4	41.4
	121 000-140 000 FCFA	657	16.4	17.4	58.8
	141 000-160 000 FCFA	207	5.2	5.5	64.3
	161 000-180 000FCFA	302	7.6	8.0	72.3
	181 000-200 000FCFA	483	12.1	12.8	85.0
	>201 000FCFA	565	14.1	15.0	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	3778	94.5	100.0	
Missing	System	222	5.6		
Total		4000	100.0		

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Formal Education	1307	32.7	33.7	33.7
	Primary Education	1508	37.7	38.9	72.7
	Secondary Education	826	20.7	21.3	94.0
	Tertiary Education	232	5.8	6.0	100.0
	Total	3873	96.8	100.0	
Missing	System	127	3.2		
Total		4000	100.0		

Number of Children

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	406	10.2	10.5	10.5
	Less than 3	917	22.9	23.7	34.2
	3 - 5	1229	30.7	31.8	66.0

	Above 5	1317	32.9	34.0	100.0
	Total	3869	96.7	100.0	
Missing	System	131	3.3		
Total		4000	100.0		

When did you start Cassava cultivation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before 1951	53	1.3	1.4	1.4
	1951- 1960	69	1.7	1.8	3.1
	1961-1970	93	2.3	2.4	5.5
	1971-1980	166	4.2	4.2	9.7
	1981-1990	300	7.5	7.7	17.4
	1991-2000	812	20.3	20.8	38.2
	2001-2010	995	24.9	25.4	63.6
	After 2011	1422	35.6	36.4	100.0
	Total	3910	97.8	100.0	
Missing	System	90	2.3		
Total		4000	100.0		

Why did you choose to cultivate cassava instead of another crop?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial Reasons	1729	43.2	43.2	43.2
	For Food and Consumption	598	15.0	15.0	58.2
	Cultivated by Ethnic group	394	9.9	9.9	68.0
	Encouragement from Government	33	.8	.8	68.9
	Easy Cultivation	24	.6	.6	69.5
	Financial Reason and Food consumption	1195	29.9	29.9	99.3
	More Demand	27	.7	.7	100.0
	Total	4000	100.0	100.0	

Did anyone introduce you to cassava cultivation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1016	25.4	25.6	25.6
	No	2953	73.8	74.4	100.0
	Total	3969	99.2	100.0	
Missing	System	31	.8		
Total		4000	100.0		

If Yes, who introduced you to cassava cultivation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Family Member	895	22.4	88.1	88.1
	NGO/Village Association	102	2.6	10.0	98.1
	Government (Local Authority)	19	.5	1.9	100.0
	Total	1016	25.4	100.0	
Missing	System	2984	74.6		
Total		4000	100.0		

If Yes, did the person assist you in any way?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	759	19.0	39.0	39.0
	No	1185	29.6	61.0	100.0
	Total	1944	48.6	100.0	
Missing	System	2056	51.4		
Total		4000	100.0		

If Yes, what type of assistance?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Advice	193	4.8	24.4	24.4

	Farm Clearing	44	1.1	5.6	30.0
	Machinery	87	2.2	11.0	41.0
	Provision of Cassava Stems	66	1.7	8.3	49.3
	Human Resources	238	6.0	30.1	79.4
	Money	163	4.1	20.6	100.0
	Total	791	19.8	100.0	
Missing	System	3209	80.2		
Total		4000	100.0		

Do you get assistance from the cassava association?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	249	6.2	6.8	6.8
	No	3415	85.4	93.2	100.0
	Total	3664	91.6	100.0	
Missing	System	336	8.4		
Total		4000	100.0		

Do you get assistance from the government?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	93	2.3	2.5	2.5
	No	3571	89.3	97.5	100.0
	Total	3664	91.6	100.0	
Missing	System	336	8.4		
Total		4000	100.0		

Do you get assistance from any other sources?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1462	36.6	40.2	40.2
	No	2174	54.4	59.8	100.0
	Total	3636	90.9	100.0	
Missing	System	364	9.1		
Total		4000	100.0		

What type of assistance do you get?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Advice	48	1.2	2.6	2.6
	Farm Clearing	829	20.7	44.6	47.2
	Fertilizer	68	1.7	3.7	50.8

	Machinery	793	19.8	42.7	93.5
	Provision of Cassava Stems	121	3.0	6.5	100.0
	Total	1859	46.5	100.0	
Missing	System	2141	53.5		
Total		4000	100.0		

How large is your farm land?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 – 1.0 ha.	1677	41.9	43.7	43.7
	1.1 – 2.0 ha.	1426	35.7	37.1	80.8
	2.1 – 3.0 ha.	569	14.2	14.8	95.6
	2.1 – 3.0 ha.	141	3.5	3.7	99.3
	4.1 - 5.0 ha.	16	.4	.4	99.7
	> 5 ha.	12	.3	.3	100.0
	Total	3841	96.0	100.0	
Missing	System	159	4.0		
Total		4000	100.0		

How did you acquire this land?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	By Purchase	136	3.4	3.5	3.5
	Inheritance	2928	73.2	74.8	78.3
	Gift	555	13.9	14.2	92.5
	Lease	295	7.4	7.5	100.0
	Total	3914	97.9	100.0	
Missing	System	86	2.2		
Total		4000	100.0		

Are you the only one providing labour on your farm?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	448	11.2	11.3	11.3
	No	3501	87.5	88.7	100.0
	Total	3949	98.7	100.0	
Missing	System	51	1.3		
Total		4000	100.0		

If no, what type of labour?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Family	1957	48.9	53.3	53.3
	Hired (within Cote D'Ivoire)	1001	25.0	27.3	80.6

	Hired (Foreign)	579	14.5	15.8	96.3
	Village Association	89	2.2	2.4	98.8
	Others	45	1.1	1.2	100.0
	Total	3671	91.8	100.0	
Missing	System	329	8.2		
Total		4000	100.0		

Did you face any problem in adopting cassava as your farm crop?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1097	27.4	28.0	28.0
	No	2821	70.5	72.0	100.0
	Total	3918	98.0	100.0	
Missing	System	82	2.1		
Total		4000	100.0		

If Yes, what problems did you face in adopting cassava?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inadequate rainfall in region	392	9.8	30.2	30.2

	No rural training on cassava production	370	9.3	28.5	58.7
	Difficulty in getting stems	334	8.4	25.7	84.4
	Lack of Capital	152	3.8	11.7	96.1
	Lack of Strength	51	1.3	3.9	100.0
	Total	1299	32.5	100.0	
Missing	System	2701	67.5		
Total		4000	100.0		

Do you face any problem in the cultivation of cassava?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3219	80.5	82.9	82.9
	No	664	16.6	17.1	100.0
	Total	3883	97.1	100.0	
Missing	System	117	2.9		
Total		4000	100.0		

If Yes, what problem do you face?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inadequate Rainfall	322	8.1	9.8	9.8
	Lack of Fertilizer	4	.1	.1	9.9

	Pests and Rodents	519	13.0	15.8	25.7
	High Price of getting Cassava Stems	73	1.8	2.2	27.9
	Lack of Machinery	40	1.0	1.2	29.1
	Insufficient Manpower	173	4.3	5.3	34.3
	Poor Soil Fertility	53	1.3	1.6	36.0
	Insufficient Capital	16	.4	.5	36.4
	Lack of Arable land	169	4.2	5.1	41.6
	Difficulty in getting Cassava stems	44	1.1	1.3	42.9
	No Equipment to Process	424	10.6	12.9	55.8
	Transportation	79	2.0	2.4	58.2
	Fluctuating Price of Cassava	1377	34.4	41.8	100.0
	Total	3293	82.3	100.0	
Missing	System	707	17.7		
Total		4000	100.0		

Apart from cassava, do you cultivate others crops?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3369	84.2	84.4	84.4
	No	623	15.6	15.6	100.0
	Total	3992	99.8	100.0	
Missing	System	8	.2		

Total	4000	100.0		

If yes, what other crop(s) do you cultivate?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cocoa	205	5.1	6.1	6.1
	Coffee	39	1.0	1.2	7.2
	Oil Palm	278	7.0	8.2	15.4
	Rubber	325	8.1	9.6	25.0
	Pineapple	11	.3	.3	25.4
	Tomato/Pepper	266	6.7	7.9	33.2
	Cashew	424	10.6	12.5	45.8
	Yam	1066	26.7	31.5	77.3
	Garden Egg	202	5.1	6.0	83.3
	Coco-Yam	66	1.7	2.0	85.2
	Rice	11	.3	.3	85.5
	Banana/Plantain	319	8.0	9.4	95.0
	Okra	87	2.2	2.6	97.5
	Groundnut	36	.9	1.1	98.6
	Maize	27	.7	.8	99.4
	Teak	20	.5	.6	100.0
	Total	3382	84.6	100.0	

Missing	System	618	15.5		
Total		4000	100.0		

If yes, which is the most important crop that you farm?

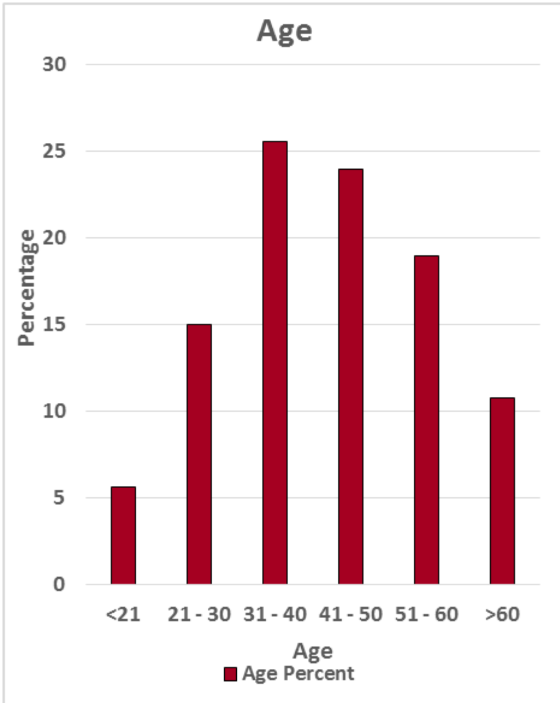
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cassava	2244	56.1	65.5	65.5
	Rubber	241	6.0	7.0	72.5
	Oil Palm	252	6.3	7.4	79.8
	Yam	208	5.2	6.1	85.9
	Cocoa	219	5.5	6.4	92.3
	Others	264	6.6	7.7	100.0
	Total	3428	85.7	100.0	
Missing	System	572	14.3		
Total		4000	100.0		

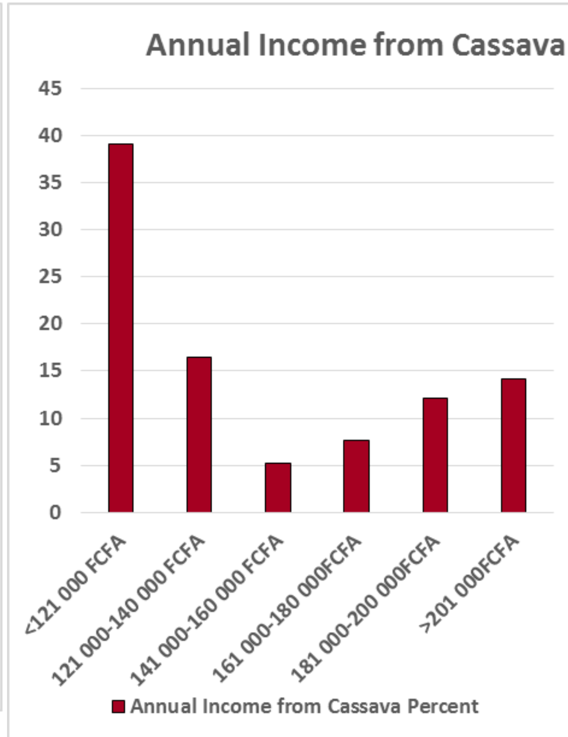
What is responsible for the choice of the most important crop?

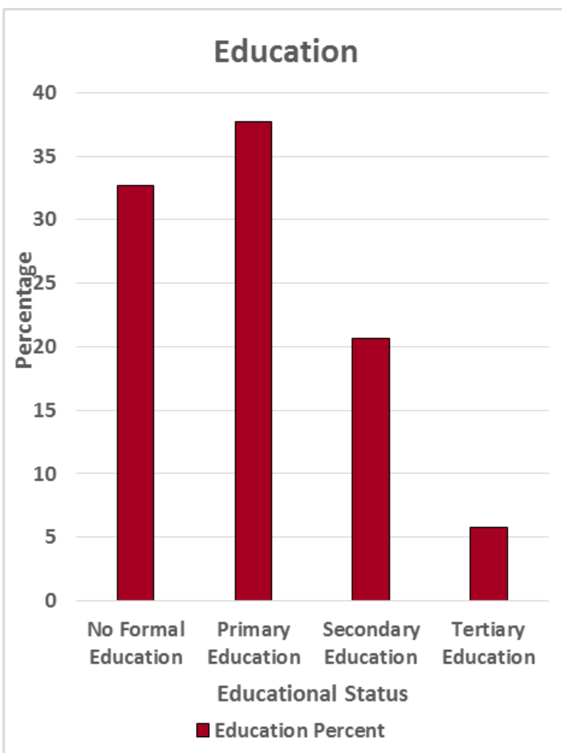
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial Reasons	1890	47.3	54.4	54.4
	For Food and Consumption	233	5.8	6.7	61.1
	Family Tradition	261	6.5	7.5	68.6

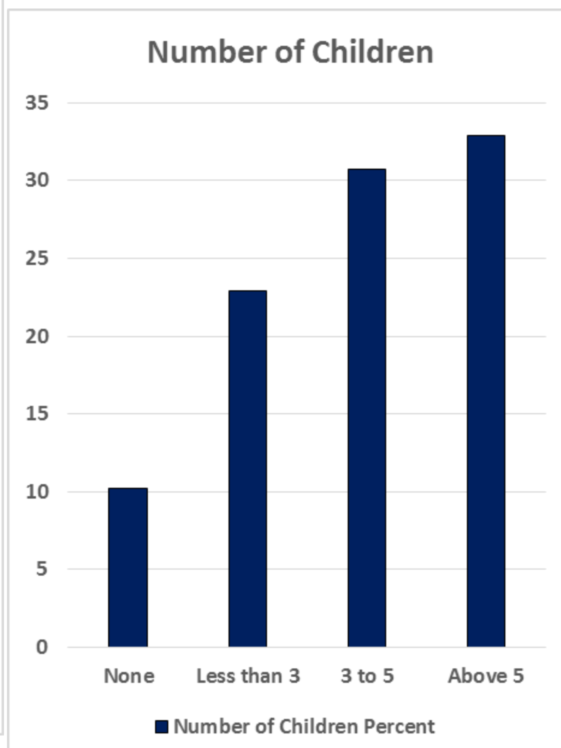
	Financial Reasons & Family Consumption	1026	25.7	29.5	98.2
	Financial Reasons, Family Consumption & Family Tradition	64	1.6	1.8	100.0
	Total	3474	86.9	100.0	
Missing	System	526	13.2		
Total		4000	100.0		

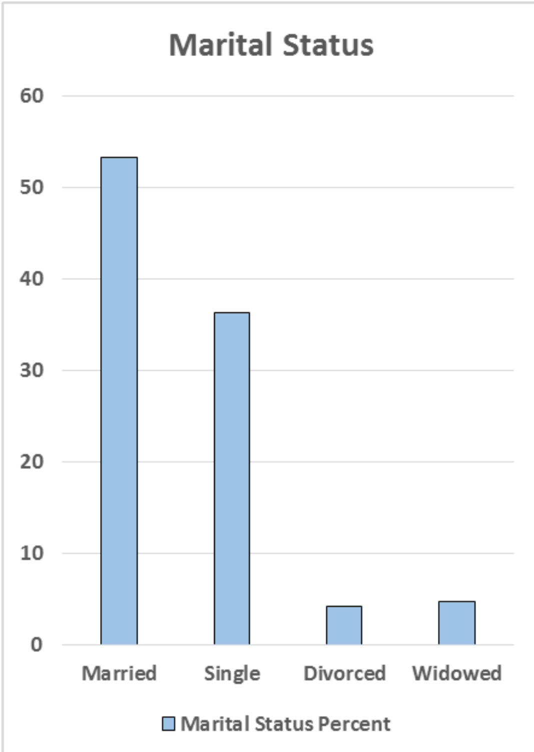
Source: Researcher's Analysis (2018).

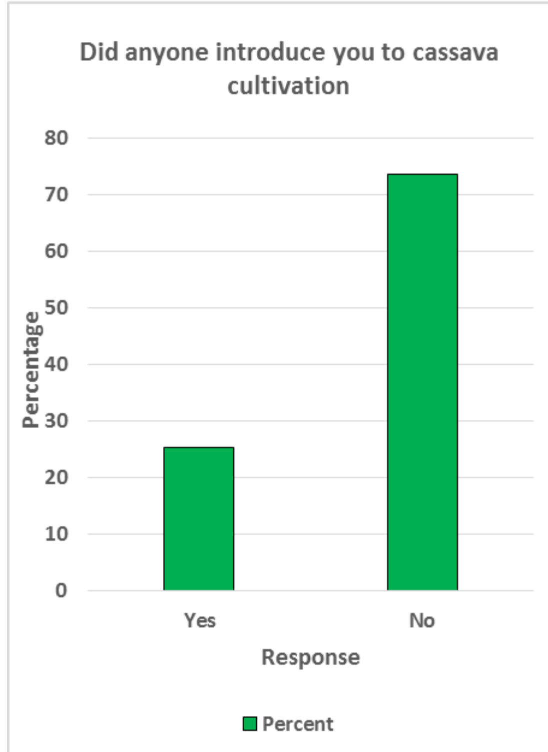

Age
30
25
20
15
10
5
0
Percentage
<21
21 - 30
31 - 40
41 - 50
51 - 60
>60
Age
Age Percent

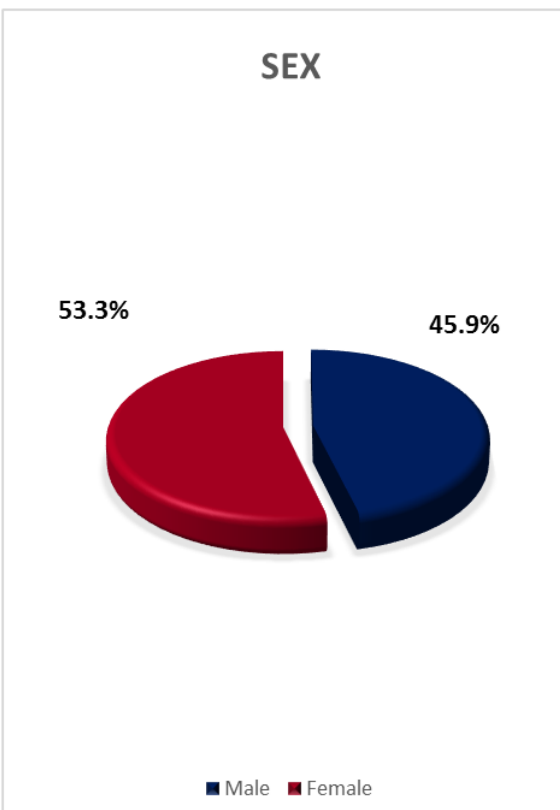

Annual Income from Cassava
45
40
35
30
25
20
15
10
5
0
<121 000 FCFA
121 000-140 000 FCFA
141 000-160 000 FCFA
161 000-180 000FCFA
181 000-200 000FCFA
>201 000FCFA
Annual Income from Cassava Percent

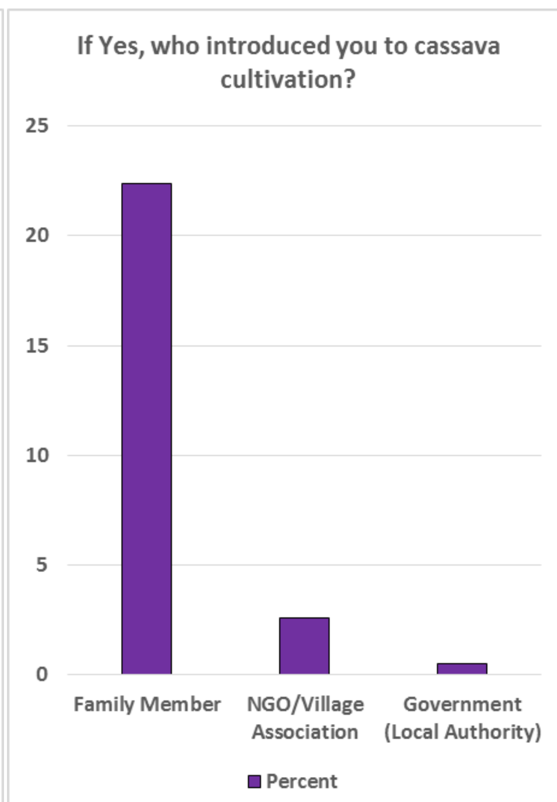

Education
40
35
30
25
20
15
10
5
0
Percentage
No Formal Education
Primary Education
Secondary Education
Tertiary Education
Educational Status
Education Percent

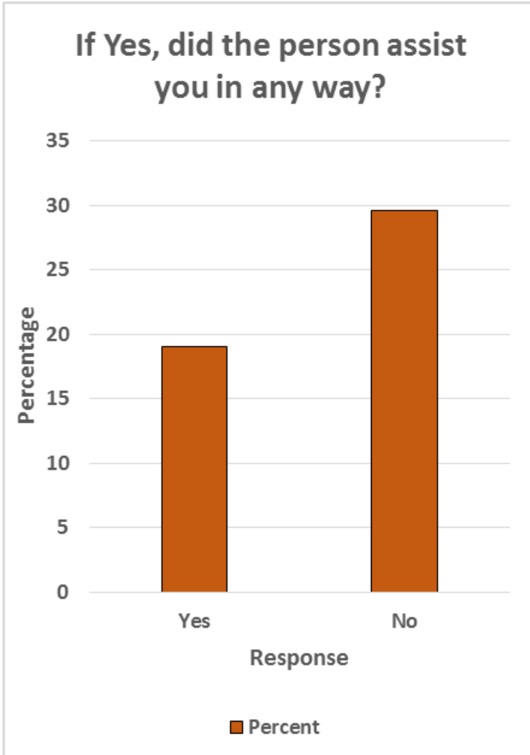

Number of Children
35
30
25
20
15
10
5
0
None
Less than 3
3 to 5
Above 5
Number of Children Percent

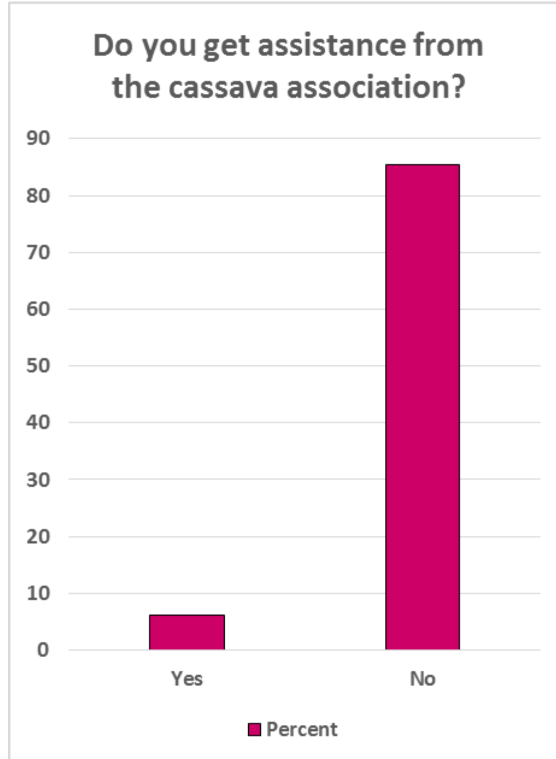

Marital Status
60
50
40
30
20
10
0
Married
Single
Divorced
Widowed
Marital Status Percent

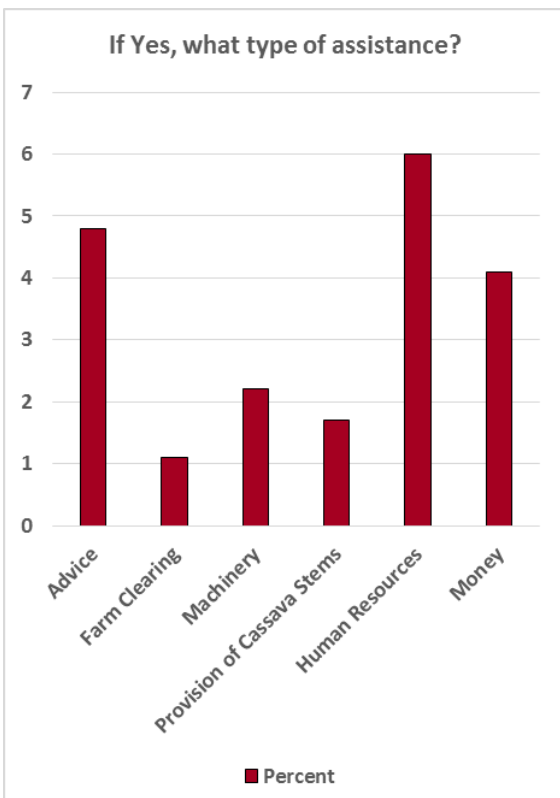

Did anyone introduce you to cassava cultivation
80
70
60
50
40
30
20
10
0
Percentage
Yes
No
Response
Percent

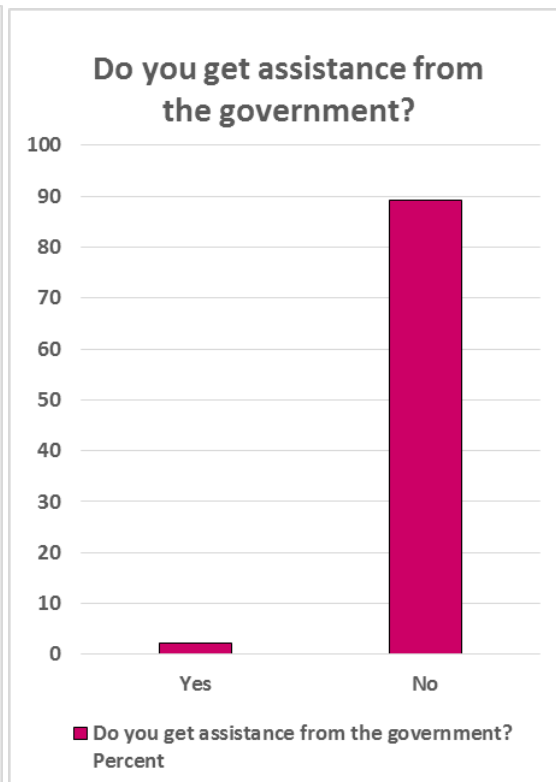

SEX
53.3%
45.9%
Male
Female

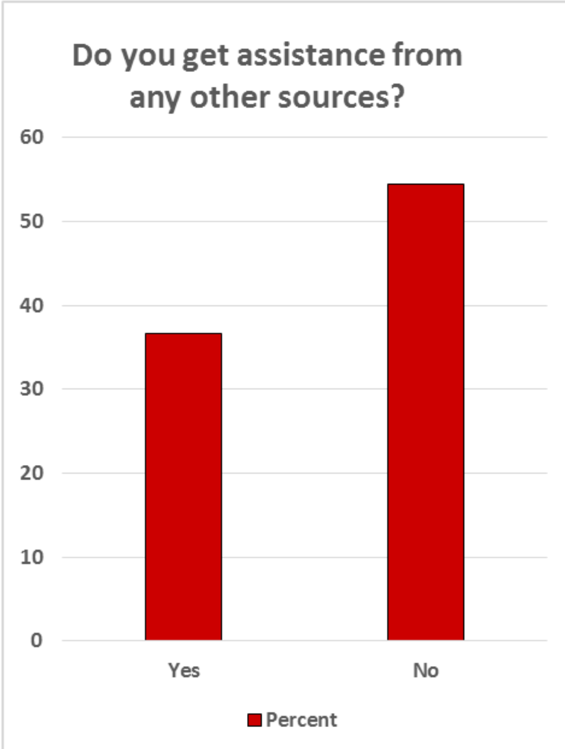

If Yes, who introduced you to cassava cultivation?
25
20
15
10
5
0
Family Member
NGO/Village Association
Government (Local Authority)
Percent

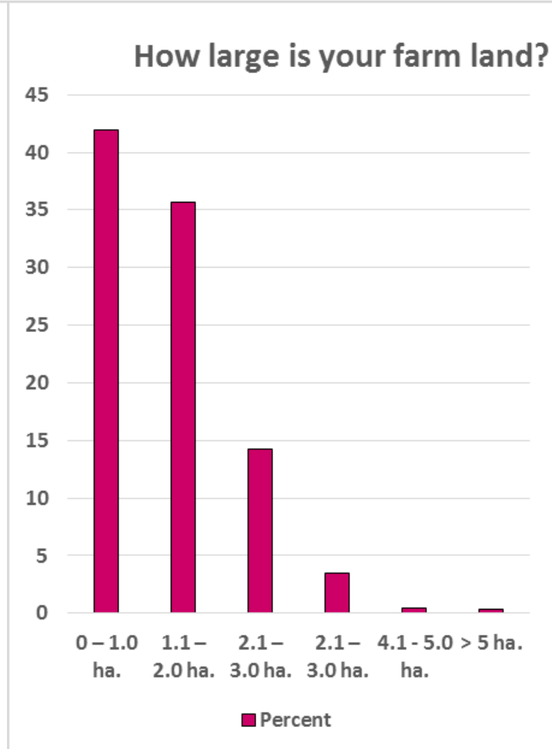

If Yes, did the person assist you in any way?
Percentage
35
30
25
20
15
10
5
0
Yes
No
Response
Percent

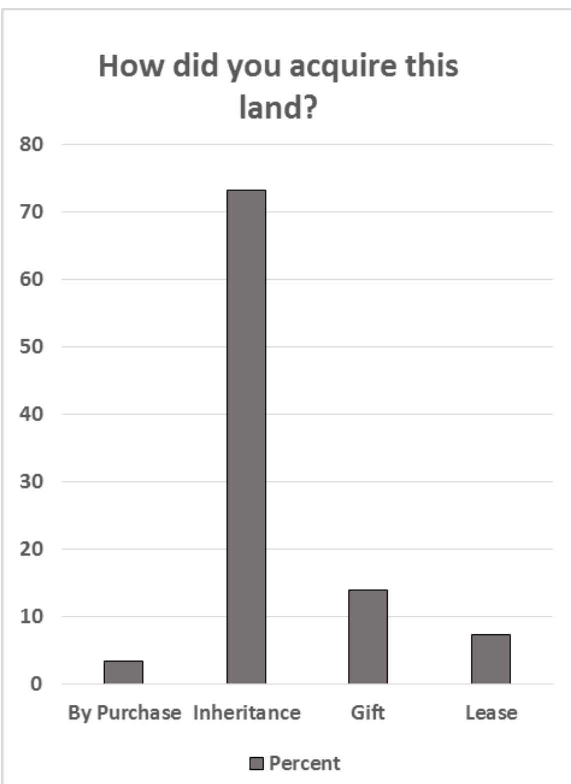

Do you get assistance from the cassava association?
90
80
70
60
50
40
30
20
10
0
Yes
No
Percent

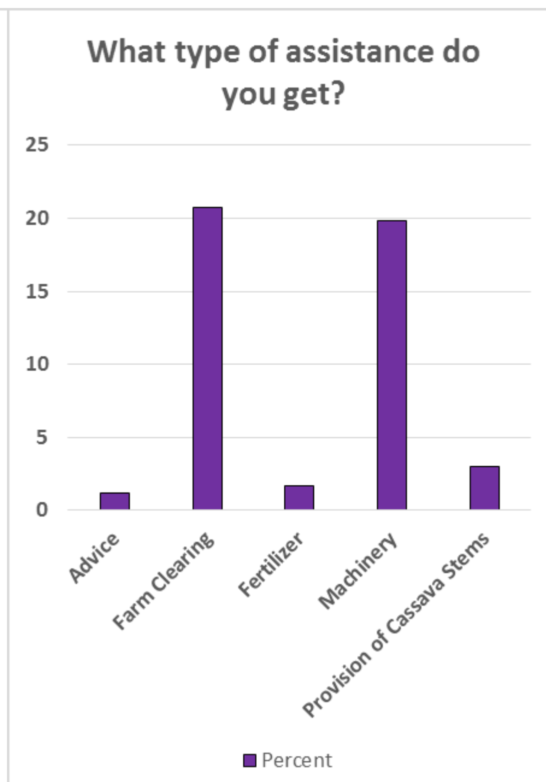

If Yes, what type of assistance?
7
6
5
4
3
2
1
0
Advice
Farm Clearing
Machinery
Provision of Cassava Stems
Human Resources
Money
Percent

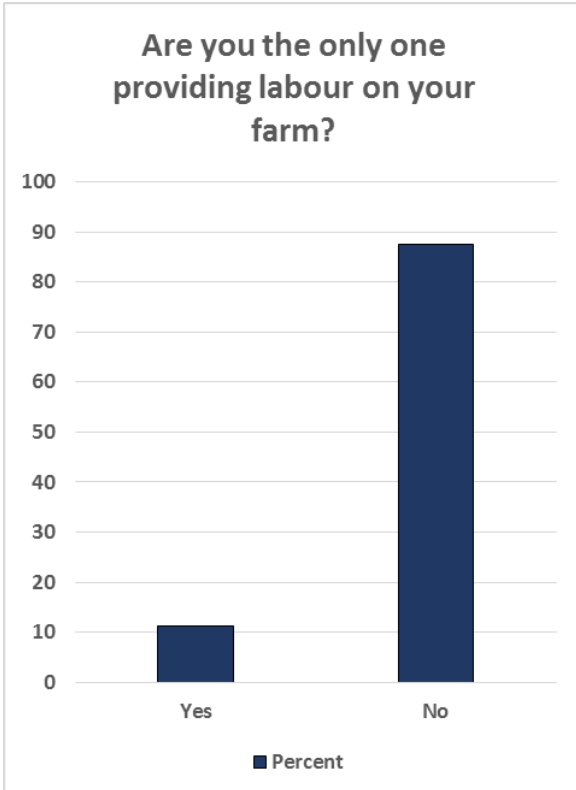

Do you get assistance from the government?
100
90
80
70
60
50
40
30
20
10
0
Yes
No
Do you get assistance from the government? Percent

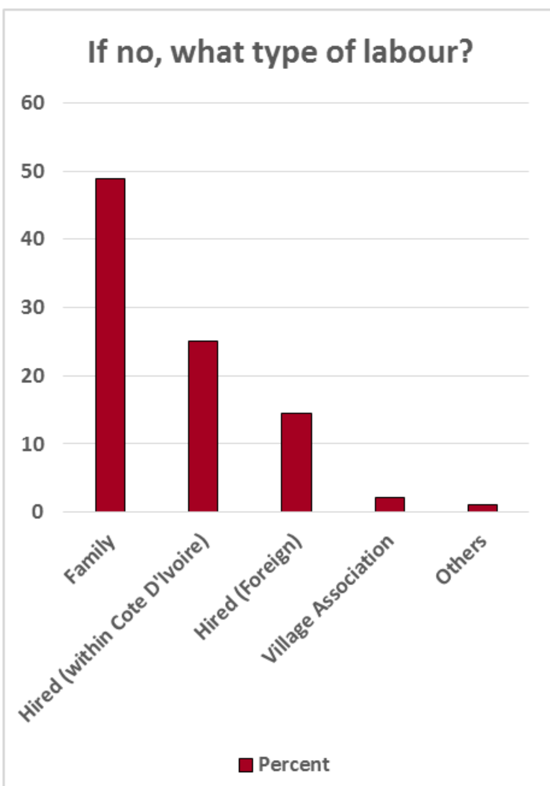

Do you get assistance from any other sources?
60
50
40
30
20
10
0
Yes
No
Percent

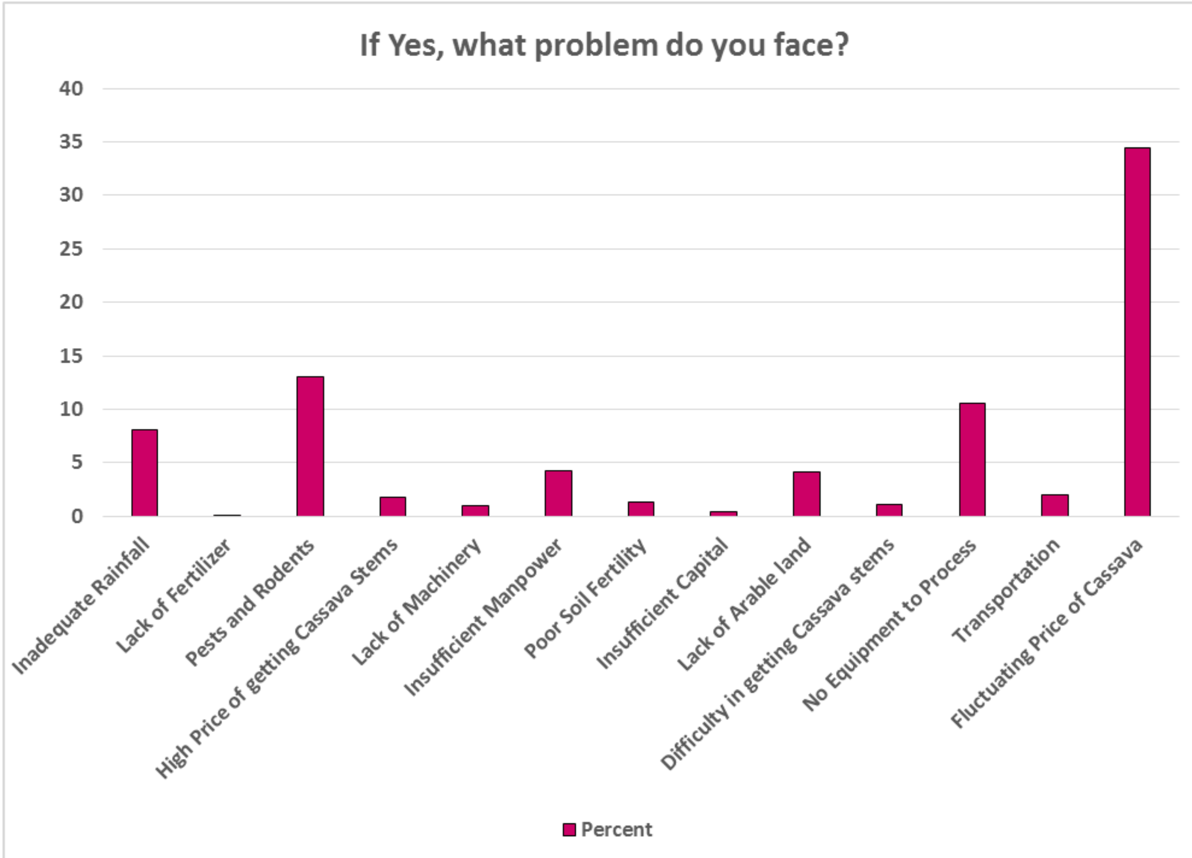

How large is your farm land?
45
40
35
30
25
20
15
10
5
0
0 – 1.0 ha.
1.1 – 2.0 ha.
2.1 – 3.0 ha.
2.1 – 3.0 ha.
4.1 - 5.0 ha.
> 5 ha.
Percent

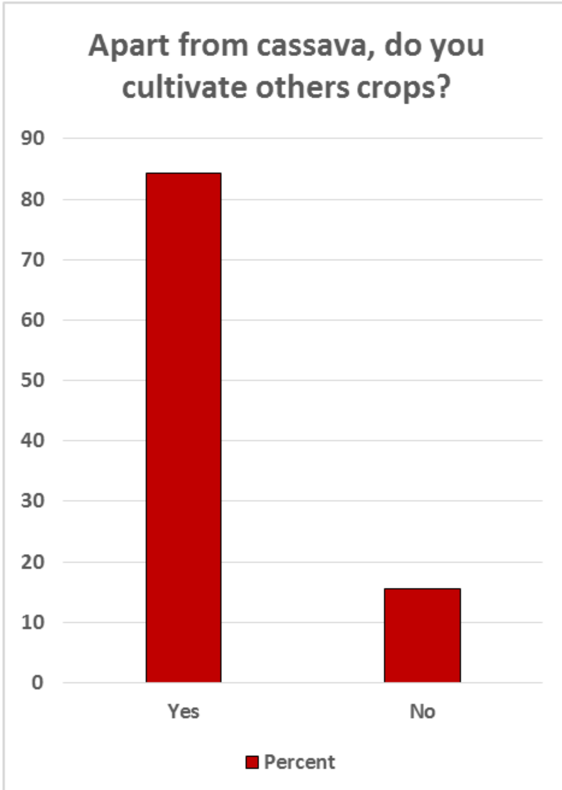

How did you acquire this land?
80
70
60
50
40
30
20
10
0
By Purchase
Inheritance
Gift
Lease
Percent

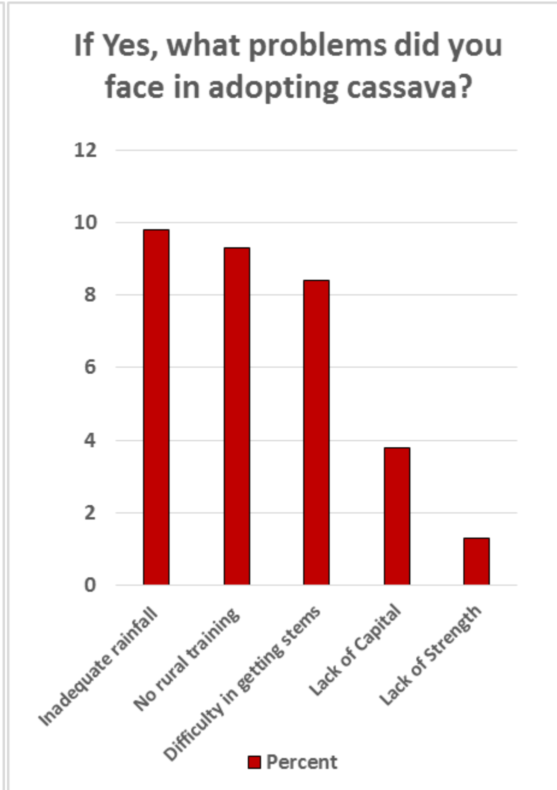

What type of assistance do you get?
25
20
15
10
5
0
Advice
Farm Clearing
Fertilizer
Machinery
Provision of Cassava Stems
Percent

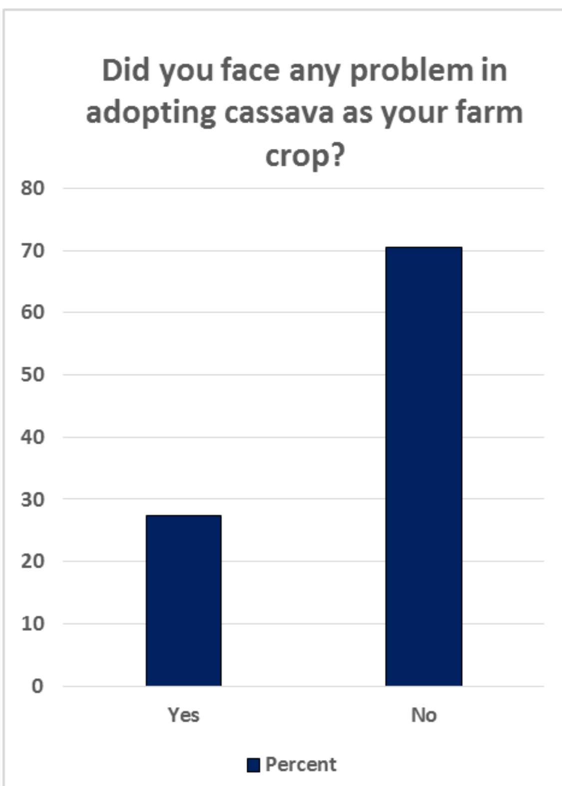

Are you the only one providing labour on your farm?
100
90
80
70
60
50
40
30
20
10
0
Yes
No
Percent

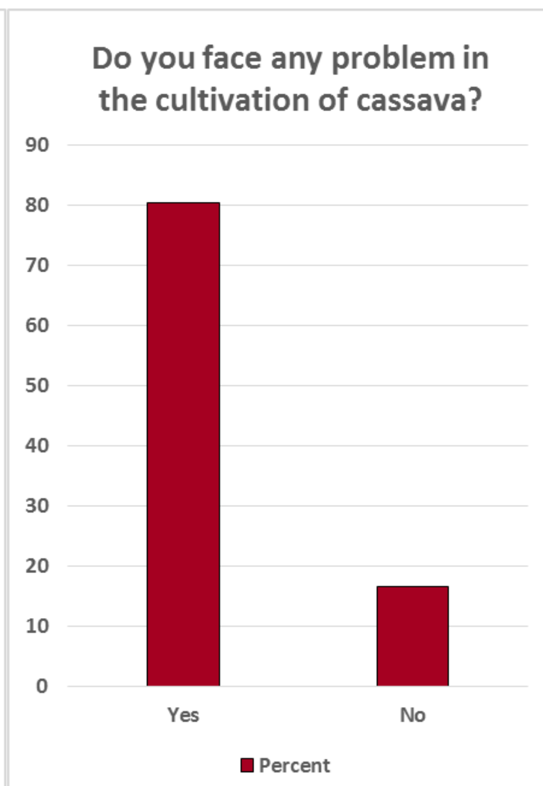

If no, what type of labour?
60
50
40
30
20
10
0
Family
Hired (within Cote D'Ivoire)
Hired (Foreign)
Village Association
Others
Percent

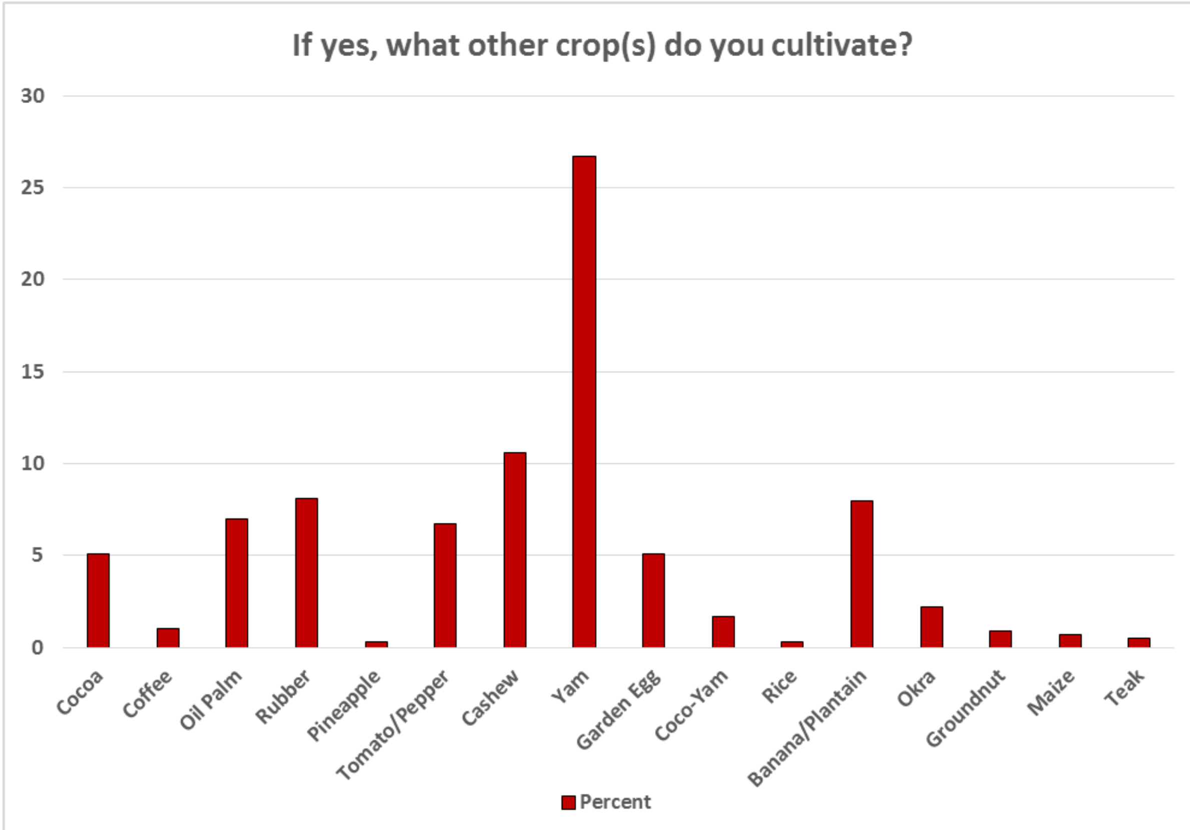

If Yes, what problem do you face?
40
35
30
25
20
15
10
5
0
Inadequate Rainfall
Lack of Fertilizer
Pests and Rodents
High Price of getting Cassava Stems
Lack of Machinery
Insufficient Manpower
Poor Soil Fertility
Insufficient Capital
Lack of Arable land
Difficulty in getting Cassava stems
No Equipment to Process
Transportation
Fluctuating Price of Cassava
Percent

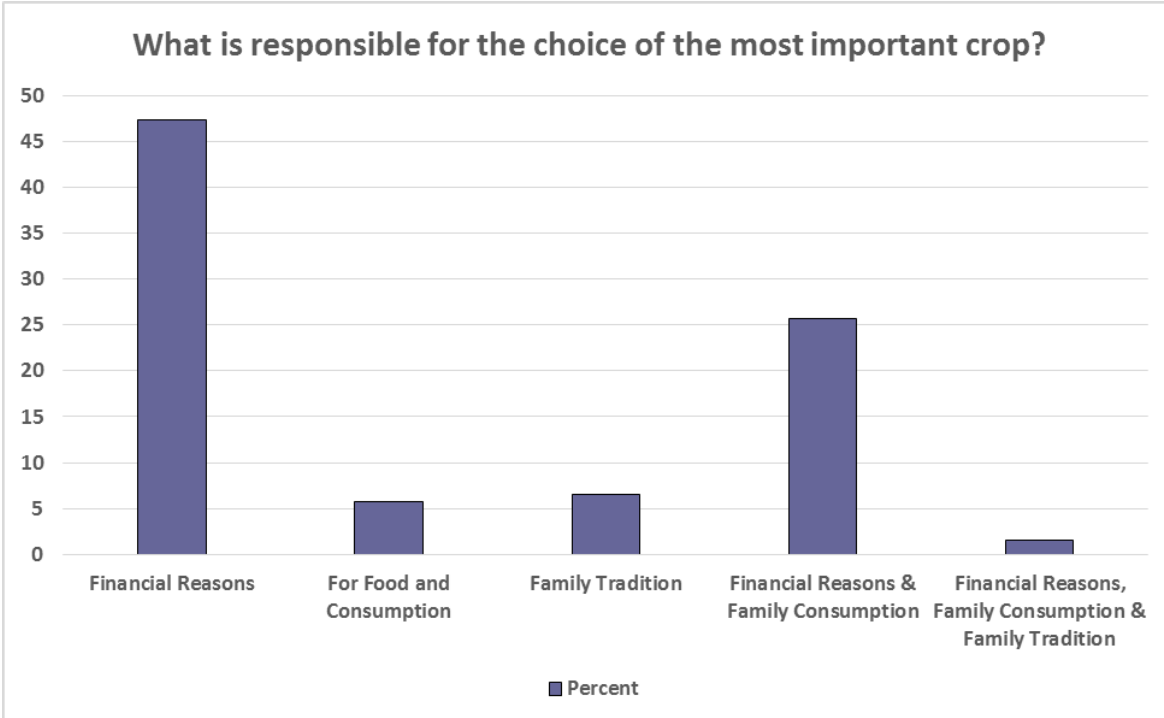

Apart from cassava, do you cultivate others crops?
90
80
70
60
50
40
30
20
10
0
Yes
No
Percent

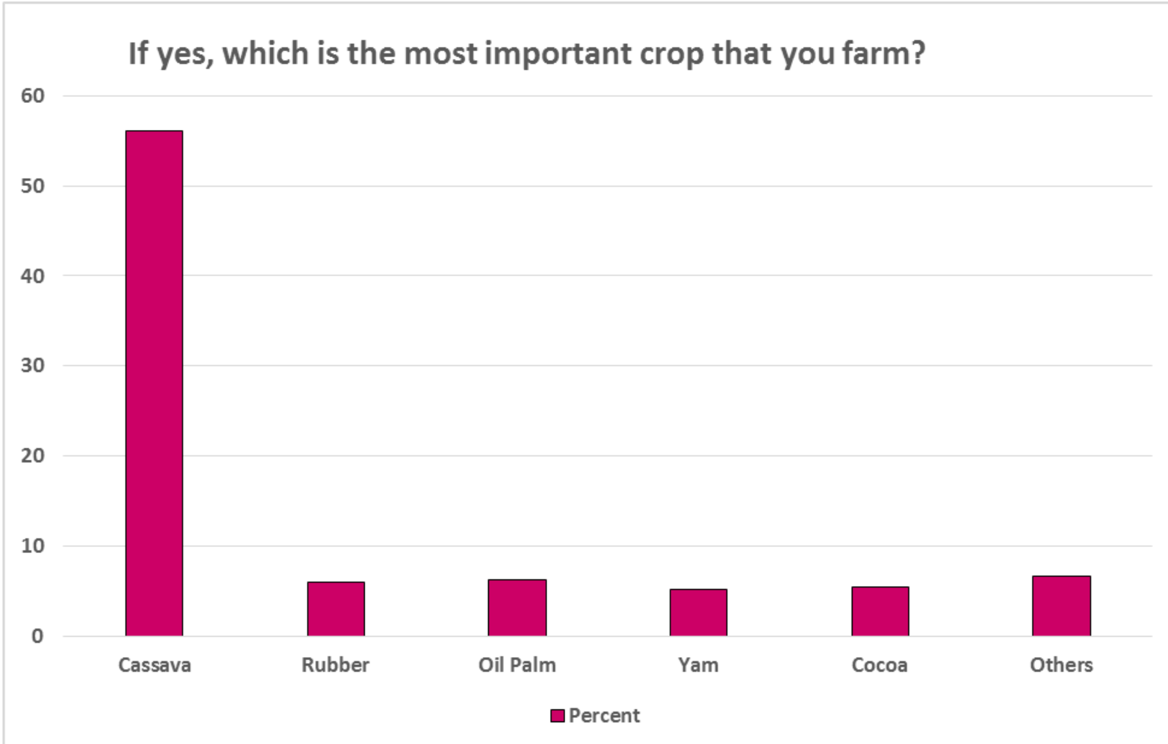

If Yes, what problems did you face in adopting cassava?
12
10
8
6
4
2
0
Inadequate rainfall
No rural training
Difficulty in getting stems
Lack of Capital
Lack of Strength
Percent


Did you face any problem in adopting cassava as your farm crop?
80
70
60
50
40
30
20
10
0
Yes
No
Percent


Do you face any problem in the cultivation of cassava?
90
80
70
60
50
40
30
20
10
0
Yes
No
Percent


If yes, what other crop(s) do you cultivate?
30
25
20
15
10
5
0
Cocoa
Coffee
Oil Palm
Rubber
Pineapple
Tomato/Pepper
Cashew
Yam
Garden Egg
Coco-Yam
Rice
Banana/Plantain
Okra
Groundnut
Maize
Teak
Percent


What is responsible for the choice of the most important crop?
50
45
40
35
30
25
20
15
10
5
0
Financial Reasons
For Food and Consumption
Family Tradition
Financial Reasons & Family Consumption
Financial Reasons, Family Consumption & Family Tradition
Percent



Global Moran's I statistical Analysis Result

Years	Moran's Index	Z score	P-value	Status	Remark
1951 -2017	0.050589	1.321241	0.186421	Not Significant	Random
2011 – 2017	0.017179	0.533718	0.593536	Not Significant	Random
2001 – 2010	0.086478	2.078046	0.037705	Significant	Clustered
1991 – 2000	0.043344	1.109402	0.267257	Not Significant	Random
1981 – 1990	0.018274	0.556387	0.577946	Not Significant	Random
1971 – 1980	0.284831	6.448118	0.000000	Significant	Clustered
1961 – 1970	0.258459	5.848493	0.000000	Significant	Clustered
1951 – 1960	0.260145	5.953709	0.000000	Significant	Clustered
Before 1951	-0.019138	-0.271747	0.785817	Not Significant	Random

APPENDIX III

Table The Population Size of each Village

District of Comoé		
Name of Village	**Number of Respondents**	**Percent of Respondents**
Aboisso	27	1.9
Abrokakro	25	1.7
Aby	30	2.1
Aby-Mohoua	27	1.9
Adiake	40	2.7
Adjouan	27	1.9
Affienou	30	2.1
Akainougbe	30	2.1
Akroaba-Akoudjekoa	31	2.1
Anze-Assahoun	27	1.9
Assakro	27	1.9
Assikasso	27	1.9
Assouba	24	1.6
Attiekro	24	1.6
Ayame	28	1.9
Bettie	30	2.1
Blekoum	22	1.5
Bonoua	28	1.9
Brindoukro	57	3.9
Dame	27	1.9
Diangobo	22	1.5
Djemissikro	24	1.6
Djimini-Kottikro	26	1.8
Ebakro	24	1.6

Ebilassokro	28	1.9
Ebokro	30	2.1
Ebonda	30	2.1
Eboue	30	2.1
Elima	30	2.1
Eltania V1-V4	30	2.1
Ettieukro	22	1.5
Etubety	28	1.9
Etueboue	30	2.1
Frambo	22	1.5
Koltikorekro	24	1.6
Kotouagnoua	24	1.6
Larabina	27	1.9
M'Braty	30	2.1
Mafere	30	2.1
Medina	27	1.9
Morokro	28	1.9
Mouyossue	23	1.6
N'Drikro	27	1.9
N'Gouanda	30	2.1
Niable	27	1.9
Nianda	20	1.4
Noe	20	1.4
Saibe	22	1.5
Samo	27	1.9
Saykro	26	1.8
Tanguelan	25	1.7
Yaou	30	2.1
Zamaka	27	1.9

Total	1458	100.0
District of Lagunes		
Name of Village	**Number of Respondents**	**Percent of Respondents**
Abeve	30	2.5
Abongoua	30	2.5
Abradimou	27	2.2
Adjame	29	2.4
Akalekro	27	2.2
Akoupe	34	2.8
Akoure	21	1.7
Alepe	33	2.7
Amangbeu	21	1.7
Andou-M'Batto	25	2.1
Attingue	31	2.6
Bakanou A	25	2.1
Batera	28	2.3
Becedi	34	2.8
Becoufin	30	2.5
Bodo	27	2.2
Broubrou	26	2.2
Broukro	26	2.2
Dabou	33	2.7
Danguira	22	1.8
Diangobo	27	2.2
Gamon	22	1.8
Gbougbo	25	2.1
Grand-Jack	24	2.0
Grand-Moutcho	23	1.9
Kanga-Nianze	27	2.2

Kassasso	20	1.7
Kassiguie	26	2.2
Katadji	25	2.1
Kouakro	25	2.1
Montezo	20	1.7
Mopoyem	24	2.0
Motobe	25	2.1
N'Douci	29	2.4
N'Gokro	24	2.0
Nianda	26	2.2
Nyan	19	1.6
Oghlwapo	22	1.8
Oguiedoume	30	2.5
Oren-Krobou	26	2.2
Sodefor Mopri	28	2.3
Songon	28	2.3
Vieux-Badren	23	1.9
Yapokoi	26	2.2
Yassap A	24	2.0
Yassap B	24	2.0
Total	**1201**	**100.0**

District of Lacs		
Name of Village	**Number of Respondents**	**Percent of Respondents**
Abigui A	26	1.9
Abigui B	25	1.9
Adaou	25	1.9
Agba-Bayasou	28	2.1

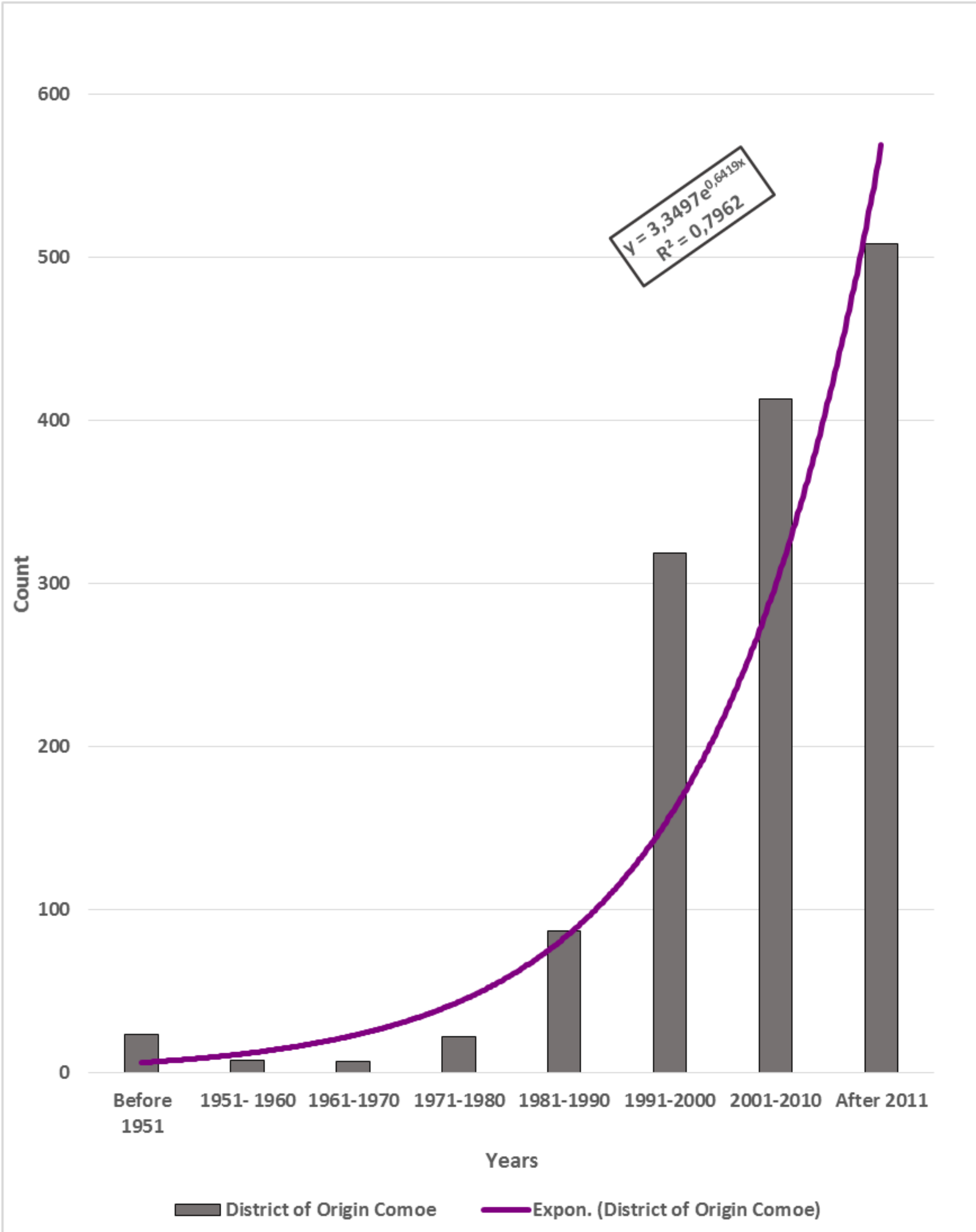
Ahounianssou	24	1.8
Ahua	26	1.9
Akpoue-Boue	29	2.2
Aman Salekro B	20	1.5
Aman-Salekro	25	1.9
Amanikro	30	2.2
Amoibro	28	2.1
Amoukro	26	1.9
Assa-Comekro	29	2.2
Assebokro	25	1.9
Assoakro	30	2.2
Assokro 1&2	33	2.5
Assouakro	29	2.2
Banabo	27	2.0
Bangokro	24	1.8
Bocanda	27	2.0
Bouaffoukro	26	1.9
Daoukro	33	2.5
Didievi	24	1.8
Dimbokro	28	2.1
Goli	30	2.2
Katieplinou	27	2.0
Kodi	28	2.1
Koffi-Amoukro	30	2.2
Kouassi Kpekro	24	1.8
Kouassi-Kouassikro	25	1.9
Krokrokro	25	1.9

M'Bahiakro	25	1.9
M'Bouacessou	26	1.9
N'Da-broukro	28	2.1
N'Drikro	25	1.9
N'Gberenou	30	2.2
N'Gokro	25	1.9
N'Gramassabo	25	1.9
N'Zecrezessou	25	1.9
Nzi-Nziblekro	28	2.1
Prikro	35	2.6
Sakro	25	1.9
Salebalekro	26	1.9
Tangoumaussou	25	1.9
Tanosso	27	2.0
Tiebissou	28	2.1
Tiemelekro	26	1.9
Toto-Kouassikro	25	1.9
Trianikro	26	1.9
Tromabo	25	1.9
Total	**1341**	**100.0**

Source: Researcher’s Fieldwork (2017).

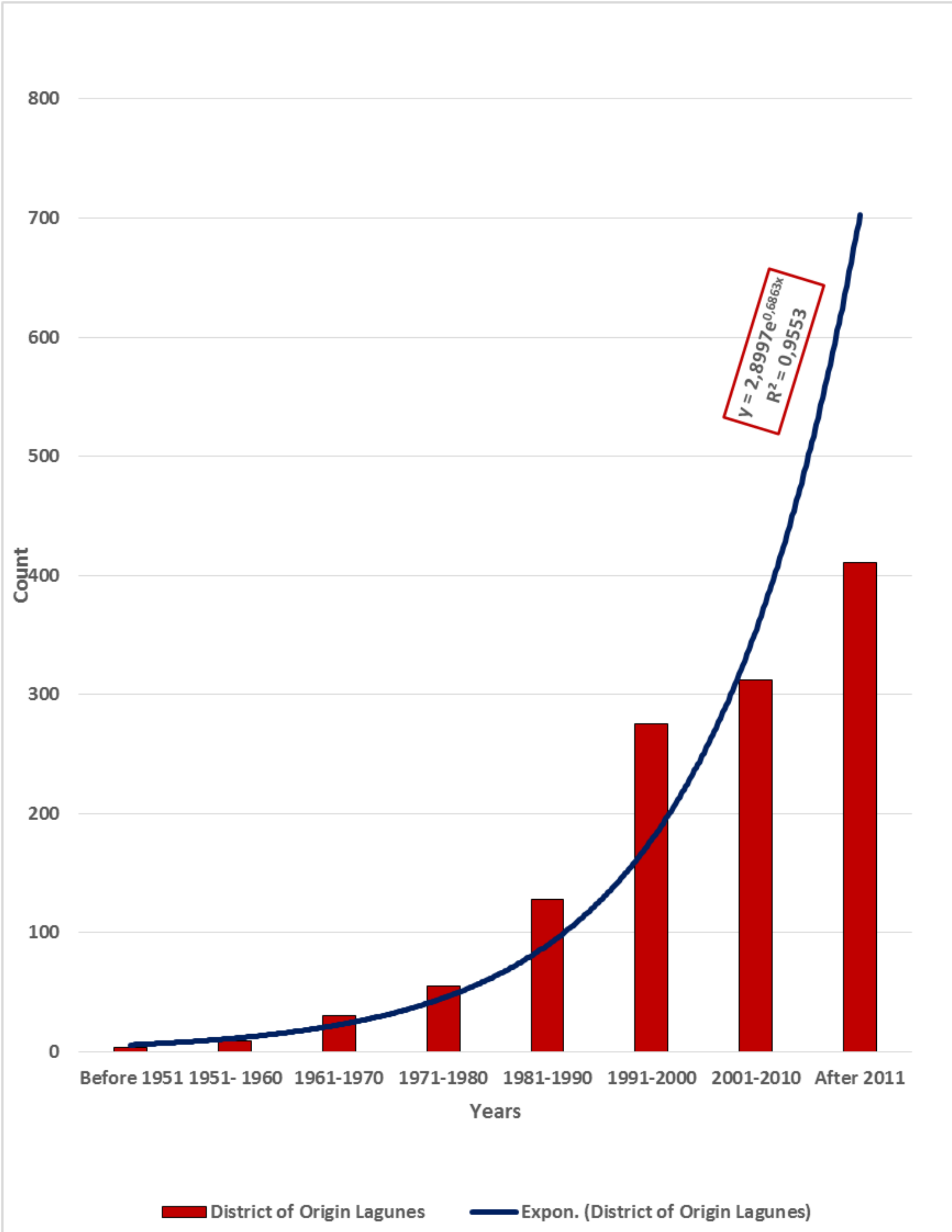
APPENDIX IV

Trend of Cassava Adoption in Comoé District



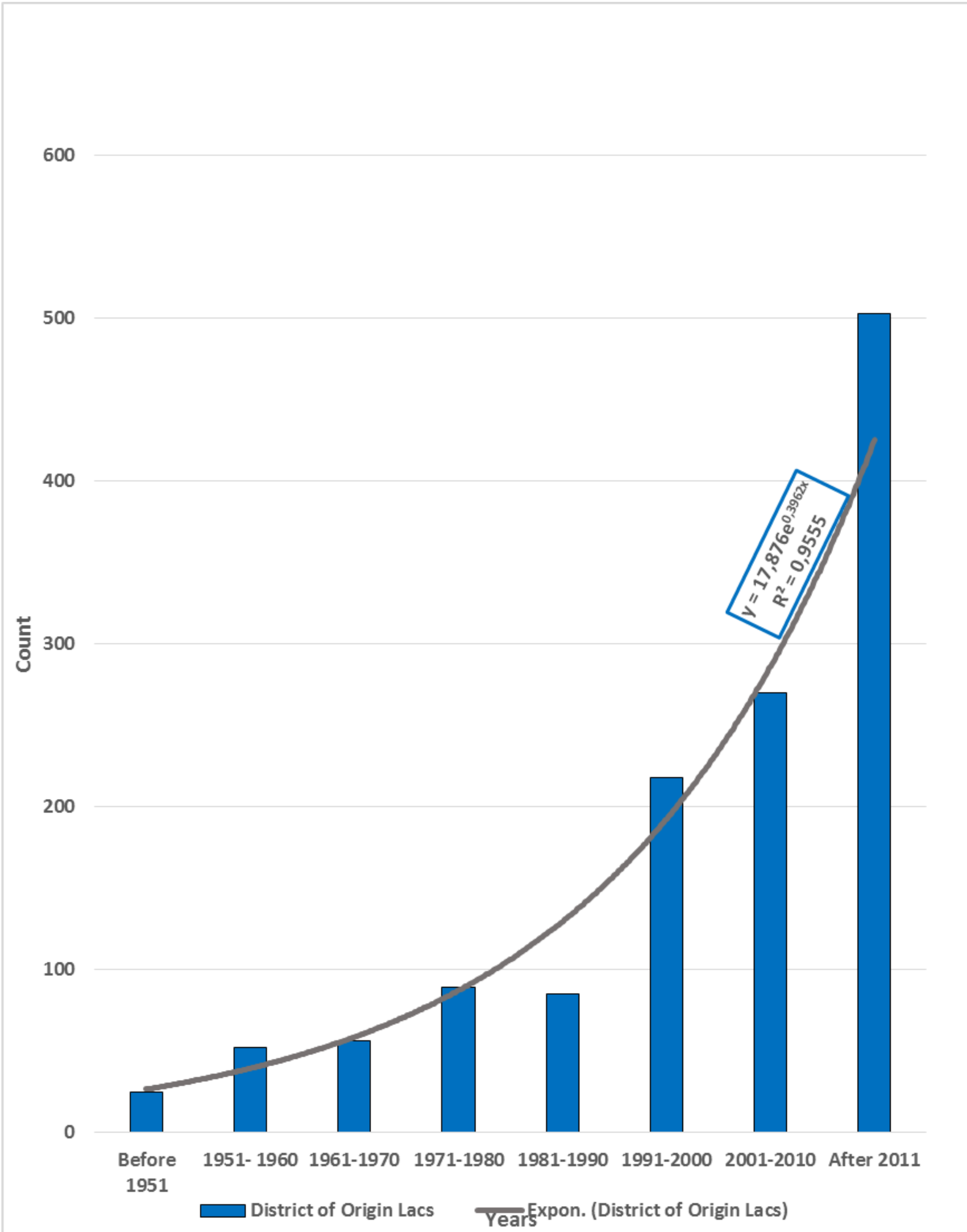
Source: Researcher's Analysis (2018).

Trend of Cassava Adoption in Lagunes District



Source: Researcher's Analysis (2018).

Trend of Cassava Adoption in Lacs District



Source: Researcher's Analysis (2018).