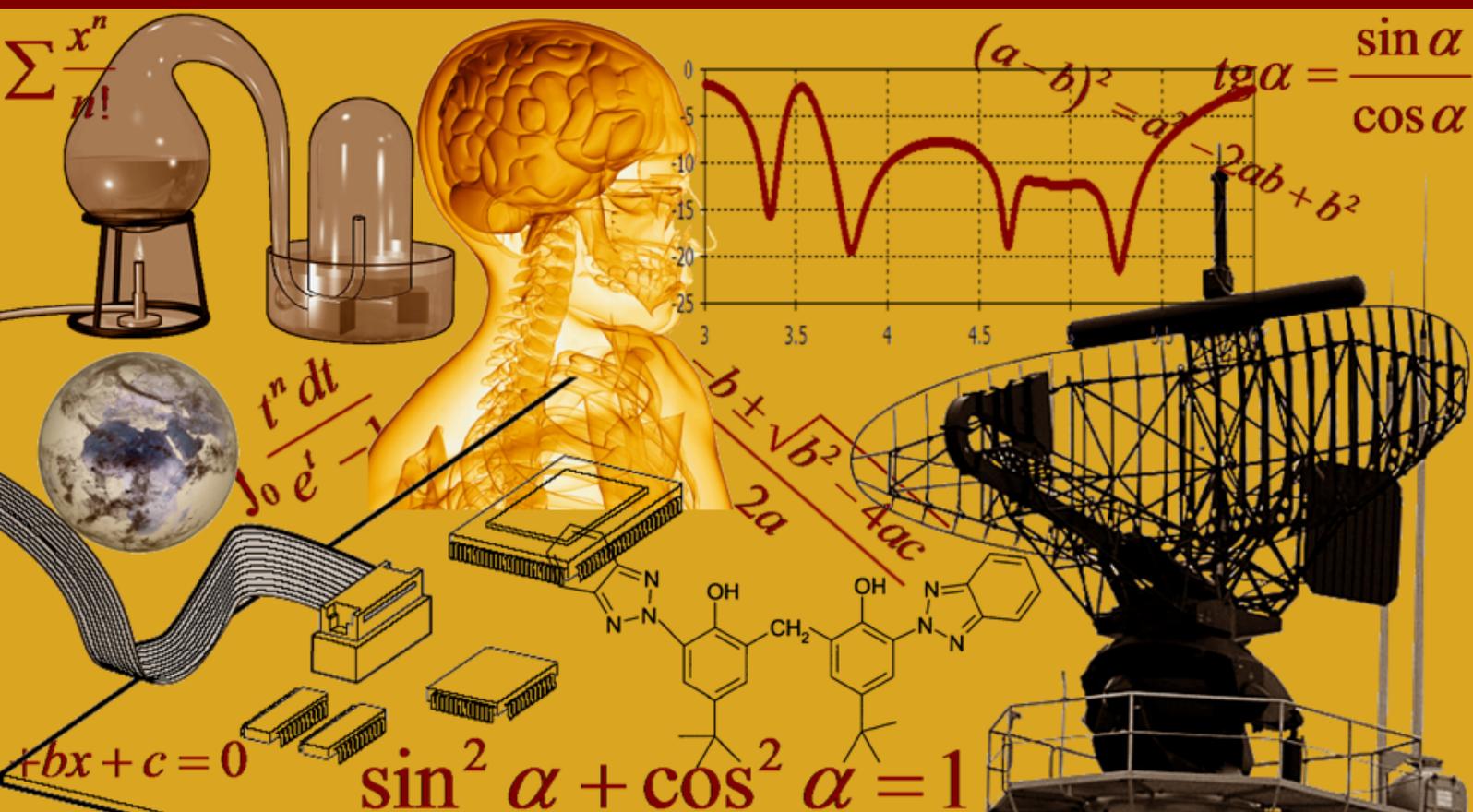# INTERNATIONAL JOURNAL OF INNOVATION AND SCIENTIFIC RESEARCH

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EFFECTS OF PROSTITUTION AND DRUG ABUSE ON URBAN AFRICA'S INDUSTRIAL GROWTH

ADIUKWU FAYOKEMI FUNMILOLA[1] and ADIUKWU FIDELIS ONYEKACHI[2]

[1]Ekiti State Ministry of Women Affairs, Gender Empowerment & Social Development, Ado-Ekiti, Nigeria

[2]Department of Architecture, Obafemi Awolowo University, Ile- Ife, Nigeria

ABSTRACT: The paper studies the rising trend of prostitution in urban Africa and the upsurge in the use of hard drugs by the youths in neighborhoods. Effects of drug abuse, trafficking and prostitution on a city's local economy; with a consequential impact on its health, security, socio-cultural and economic sustainability is theme of paper. Prostitution and drug abuse is a key factor in organized crimes. Hence, the psychosocial consequence of drug addiction, crime and poverty on the urban workforce is a subject of discuss. Sexual exploitation of women and drug abuse in the US, UK and Australia is a comparative deduction to substantiate the dangers inherent. Paper recounts Colombia's organized crime experience and discourse that in order to help young people; a multiple strategy be utilized to check and withdraw youths from these vices. The paper affirms strongly that a veritable way of dealing with prostitution and drug related offences is to alleviate poverty. In conclusion, paper suggests that Urban Africa for industrial growth needs to evolve and sustain public education and programs, aimed at skills acquisitions, and create employment opportunities for youths that offer options for 'escape' thereby promoting healthy behavior and lifestyle.

KEYWORDS: Africa, Drug Abuse, Drug Trafficking, Organized Crime, Poverty, Prostitution.

1   INTRODUCTION

Africa is the world's second largest continent, with a total surface area of 30.3 million km^2, including several islands and territories. It accounts for about 14.72% of the world's human population, and currently, an estimated total population of over 1.0 billion people. However, it has huge promising energy resources. Africa remains the world's poorest and most underdeveloped continent. Today there are men and women who prostitute in cities. They sell their bodies for many reasons other than money. Many women and young girls get into prostitution because of poverty. However, the harsh fact is that without an alternative, many have no choice but to continue, for survival. Just like everybody else, those in prostitution desires - a home, an education, a job, health care, a partner, and a community (Hoigard and Finstad, 1992; El-Bassel et al., 1997). The primary motivation towards prostitution is logically, a need for money.

There is an upsurge in violent crime and the use of hard drugs in neighborhoods by youths; the youth have become more engaged in hard drugs partly due to circumstances and factors beyond their control. A *get-rich-quick Mentality*, which despises hard work, effort and challenge, set in. Many believe such attitudes are hard to combat. Good jobs are limited nevertheless; many youths are much apathetic to education. This vicious circle must be broken. In some nations, education are neglected for decades, due partly to war, internal conflicts, terrorism as the case of *Boko Haram* (Nigeria), *Al Shabab* in the East Africa(Kenya, Somalia and Sudan), and the results of thisS are sadly very visible today. Africa is, less protected from the impact of drugs trafficking trades. The next section study prostitution in Africa, for purpose of clarity, male prostitution is not a subject of discussion and the word 'sex worker' is substitute for 'prostitute'.

2   LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1   PROSTITUTION IN AFRICA

Prostitution is a global phenomenal issue permeating societies and civilization for generations immemorial. A study in the UK affirms that 80,000 women work in 'on-street' prostitution with a female to male ratio of four to one (Home Office, 2004). Poverty more often, is a driving-force behind the increasing trend of prostitution in urban Africa's neighborhoods. One in two persons in Sub Saharan Africa survive on less than one dollar per day and about 184 million people – 33% of the African population – suffer from malnutrition and extreme poverty. For a certain part of the female population who are unemployed, prostitution seems the only means to provide for themselves and their families. Most scholars and researchers affirms the exceptional condition in Africa with dismay where [some] husbands, fathers and brothers drive their wives, daughters, and sisters into illegal means of livelihood, including prostitution, because they do not have a job and means to live on. Many cities harbor prostitutes who ply their trade- day and night, some in the brothel, and others on the street and few as tourist escorts. All these issues have adversely affected the psychosocial and economic indices of healthy living. These are issues examined in the next section and subsections.

2.2   CAUSES OF PROSTITUTION IN AFRICA

Poverty and unemployment in Africa is an activating factor in the rapid spread of prostitution. It provides those involved in this profession a considerable amount of income to support their families. Family expectations and problems are common factors why many are tempted into the prostitution business. Women and young girls are compelled to pay for their sibling's education or support an ailing family member. Aspects such as constant abuse from parents have led adolescents to leave their homes and attracted by the easy earnings from prostitution. From information gathered during interviews with local prostitutes, in Lagos, Kampala, and Accra the following reasons seem the most prominent.

2.2.1   POVERTY

Most women and young girls involved in prostitution cited poverty, the need to pay household expenses and support their children, as a primary motivator for entering sex work. Nearly all the women interviewed mentioned poverty, lack of financial support from their family and the need to eat and clothe themselves as reasons for getting involved in prostitution. Even though there are also males who prostitute themselves, prostitution in Africa still appears to be a largely female domain.

2.2.2   UNEQUAL GENDER RELATIONS

The subordination of women in a society dominated and controlled by men, and the unequal gender relations embodied in customary practices are determining factors. Many interviewees explained, that their relations with men, is mostly for material gains. This gives an image of the woman, as a 'sex object'. This image devalues, degrades, and establishes mechanisms of sexual and economic subordination of young girls and woman in relation to the men.

2.2.3   FAMILY DISINTEGRATION

Prostitution in urban Africa is also, influenced by socio-cultural changes from customary values to those of a modern society. In the course of many interviews, the event in the personal history of some prostitutes that caused them to take up prostitution amongst other was the death of a breadwinner like a father or mother, or the separation of the parents.

2.2.4   LACK OF EDUCATION AND UNCERTAIN FUTURE

In the last two decades, most schools in Africa are, destroyed by war, civil conflicts, terrorism or natural disasters, and this has posed huge challenges in rehabilitation. Fewer young females enroll at school, and are more likely to drop out. For those who have the opportunity to go to school, conditions are basic and learning materials are in short supply. Because of limited employment opportunities, many realize that their chances of obtaining good jobs are poor; these contribute to a lack of optimism to the future thus creating a strong attraction for prostitution as a way of survival.

2.2.5   SEXUAL EXPLOITATION, VIOLENCE AND RAPE

Research from many developed nations shows that most women and young girls, who later engage in prostitution, were sexually exploited or raped by an employer, father, stepfather, uncle or boys from the neighborhood. More than half of women in prostitution are either been raped and or seriously assaulted. In the UK, for example as many as 85% of women in prostitution report physical abuse in the family, with 45% reporting familial sexual abuse (Home Office, 2004). The types of violence experienced included being slapped, punched, or kicked; robbery; attempted robbery; beaten; threatened with weapon; held against will; attempted rape; strangulation; kidnapped; attempted kidnap; forced to give client oral sex; vaginal rape and anal rape (Church, S., et al, 2001). About 80% of women in prostitution have been the victim of a rape. This is hard to talk about because the experience of prostitution is just like rape. Prostitutes are, raped on the average, eight to ten times per year. They are the most raped class of women in the history of our planet (Susan K Hunter and K.C. Reed, 1990)

2.2.6   MIGRATION, MOBILITY AND HUMAN TRAFFICKING

Migration and prostitution often is, linked as poor migrants who newly arrives a neighborhood sometimes turn to prostitution if they cannot find other means to survive. Migrants may also become the clients of sex workers, sometimes as a means of escaping the loneliness that often accompanies migration. In recent times, sex tourism is stimulating the demand for sex workers in many modern cities of Africa. In addition human trafficking – situation whereby people, usually women, and children are, moved against their will between neighborhoods and nations- Large numbers of trafficked women and children are, forced into prostitution every year in Africa's cities. The next section examines the behavioral act of prostitutes.

2.3   BEHAVIORAL ACT OF PROSTITUTES IN AFRICA

2.3.1   MULTIPLE PARTNERS

In Africa, sex workers have comparatively high numbers of sexual partners. This in itself does not necessarily increase their chances of infection with diseases – if they use condoms consistently and correctly then they probably, will be protected. The reality, however, is that in most urban Africa cities, sex workers and their clients do not always use condoms. Though efforts are made by Government and concerned groups in promoting safe sex. In other case, sex workers are powerless to bargain safer sex, even if they try to do so; Clients at times use threats or violence to enforce unprotected sex (this is usually the case of a street sex worker). Prostitutes in brothel and sex tourist girls are, found to use condom more regularly, nearly 95%. Clients, may also offer more money for unprotected sex – a proposal that can be hard to refuse by an impoverish sex worker in desperate need of an income.

2.3.2   DRUG USE

Most prostitutes are addict drug users and often time become involved in prostitution as a means of financing their drug use, while others are involved in prostitution first, and then turn to drug use – perhaps to escape from the intense emotional and physical burden of their work, or because other sex workers have introduced them to it. About 80-95% of women who are involved on the streets are problematic drug users (May, T. and Hunter, G., 2006).

2.3.3   IGNORANCE

Ignorance is a factor associated with prostitution in Africa. However, several Government, NGO and interest groups have adopted programs aimed at information and education in addressing this trend with significant results. The danger and consequence of infections in several case; is many time neglected by many sex workers with an almost indifferent attitude towards their own safety and future prospects. This is due to their desperate situation.

2.4   RISKS OF PROSTITUTION

Those engaged in prostitution come from various backgrounds and cultures, and can differ greatly in the lives that they live. In the same way, the levels of risk that they face in terms of STD's and HIV infections differs, depending on the nation they live in, whether they work from a brothel or 'on the street', and whether they have access to condoms, amongst other factors. Pedersen (1994) affirms that an interest in controlling the spread of HIV has motivated a trend toward legitimizing prostitution as just another job. Though prostitution is partly, legal in some nations in Africa, the law rarely protects them. In Africa, there is inappropriate legislation and policies protecting prostitutes from the actions of clients that can put them at

risk. For example, a sex worker raped will have little hope of bringing charges against her attacker. The lack of protection in such cases leaves sex workers open to abuse, violence, and rape, and in such an environment, it is easier for HIV and STD's transmission to occur. Women in prostitution are 18 times more likely to be, murdered than the general population (New Philanthropy Capital, 2007).

People are much less likely to be, convicted of murdering a prostitute than of any other murder. The conviction rate of 75% for murder drops to 26% when it comes to killings of women in prostitution. [Raymond, K., 2006]. The next section looks at the law and prostitution.

2.5   SOCIETAL ATTITUDES TOWARD PROSTITUTES

Many sex workers testify to facing problems from their parents, their peers, or members of the community because of the work they are doing. Most communities respond to prostitution in a generally negative way, often rejecting them, which lead to their further isolation. The community is condemning this behavior but the cost of living necessitates them to stay involved in this activity. It is necessary to promote awareness at neighborhood level for the families about the dangers of this activity. In addition, the stigma that sex workers face can make it hard for them to access health, legal, and social services. Either, they may be afraid to seek out these services for fear of discrimination, or physically prevented from accessing them. The rehabilitation and reintegration of sex workers into the community is often difficult to achieve. The next section considers organized crimes in Africa with its inherent dangers in the political, economic and socio-cultural sustainability of urban livelihood.

2.6   PROSTITUTION AND THE LAW

The position of prostitution and the law varies extensively worldwide, reflecting differing views on victimization and exploitation, inequality, gender roles, gender equality, ethics and morality, freedom of choice, historical social norms, and social costs and benefits. The legal status of prostitution varies from nation to nation, from being a legal activity considered a profession to being punishable by death. In some jurisdictions, prostitution is illegal. In other places prostitution itself (exchanging sex for money) is legal, but surrounding activities (such as soliciting in a public place, operating a brothel, and pimping) are illegal. While in other jurisdictions, prostitution is legal and regulated. Prostitution is illegal in most Africa nations with a few exceptions. Prostitution tends to be contentious in the communities in which it exists. The religious, may be morally, irritated by its presence, viewing it as a threat to the moral values in their scriptures. Many feminists and women' organizations are opposed to prostitution, as they see it as a form of exploitation of women. United Nations in its Convention for the Suppression of the Traffic in Persons and the Exploitation of the Prostitution of Others, favors abolitionism, which criminalizes the activities of those seen as exploiting or coercing prostitutes. While leaving prostitutes themselves free from regulation. The Convention affirms, "Prostitution and the accompanying evil of the traffic in persons for the purpose of prostitution are incompatible with the dignity and worth of the human person.

3   DRUG ABUSE IN AFRICA

Ben-Arie (1985) defines drug abuse as the consumption, without medical supervision, of medically useful drugs, which alter mood and behavior for a purpose other than that for which it is, prescribed or the consumption of any mind changing drugs that have no legitimate medical or socially acceptable use. The consequence of the two has devastating effect on the youths leading to further vulnerability. A study among people entering treatment for substance abuse in the US showed just over half (51%) of women and 11% of men had a history of prostitution (Bernette, M., et al 2008). There is a proliferation in the use of hard drugs in most African urban neighborhoods in recent time; the youth have become more involved in hard drugs partly because of the circumstances they are in and due to factors beyond their control; including poverty and unemployment. Drugs commonly abused by youths include alcohols, tobacco products, marijuana, inhalants, depressants, cold medications, stimulants, narcotics, hallucinogens, PCP, Ecstasy, and anabolic steroids. A drug is, used in a variety of ways including injecting, drinking, smoking, snorting and rubbing. Some of the symptoms and warning signs of drug abuse include reddened eyes, paranoia, sleepiness, excessive happiness, seizures, memory loss, increased appetite, discolored fingertips, lips or teeth, and irritability. Treatment of drug addiction may involve a combination of medication, individual, and familial interventions. Available data from the Police, NGOs and Health centers in urban Africa, indicate an increase in use of drugs. There is a higher use of hard drugs and substances in urban areas compared to rural areas.

3.1   PROSTITUTION AND DRUG ABUSE

A study of UK cities found 63% of people who sold sex did so mainly to pay for drugs. A strong correlation is, observed between drug abuse, and prostitution on the streets in Lagos, Johannesburg, Cairo, Mombasa, Accra, Addis Ababa, Harare and Casablanca. It is, yet to be determined if the onset of drug abuse, precedes prostitution, or follows soon after. It can be, suggested though that the development of drug addiction would undoubtedly create the need for a convenient means, such as prostitution, to pay for the habit; equally true is the premise that drugs e.g. marijuana is needed by the prostitute to alleviate the degradation and humiliation felt in the act of prostitution. Several studies have documented the use of drugs to cope with prostitution. According to research, women and young girls, who use drugs, before engaging in prostitution, have often been, found to become heavier users after becoming prostitutes. It is very likely that prostitution and drug use is a self-perpetuating cycle in which the engagement in one leads to an increase in the other. An Australian study of women involved in street-based prostitution found very high rates of drug use (83% heroin, but also cocaine, methamphetamine, cannabis and alcohol) and injecting, as well as risky use behaviors. Also found is high levels of mental health problems (e.g. 54% severe depressive symptoms), including suicidal thoughts (74%) and attempts (42%) (Roxburgh, A, et al, 2008).

3.2   THE EFFECTS OF PROSTITUTION AND DRUG ABUSE ON SOCIETY

Prostitution affects our society in many ways. It is more than just a sexual related offense and can actually lead to more crimes and violence on the streets. Over the years, it has become a threat to our society. Unfortunately, when soliciting a prostitute, many buyers do not think about the serious consequences that come with it. Sexually transmitted disease, infidelity, violence, thefts, and many crimes take place daily with the average prostitute exchange. The negative consequences of prostitution and drug abuse affect not only individuals who are involved but also their families and friends, businesses, and government. The economic impact of drug abuse on businesses whose employees abuse drugs can be very significant. While many drug abusers are unable to attain or hold full-time employment, those who do work put others at risk, particularly when employed in positions where even a minor degree of impairment could be catastrophic; airline pilots, air traffic controllers, train operators, medical practitioners, and bus drivers are just a few examples. Economically, businesses, are affected because employees who abuse drugs sometimes steal cash or supplies, equipment, and products that can be sold to get money to buy drugs. The economic consequences of drug abuse severely burden government resources and, ultimately, the taxpayer.

3.2.1   SOCIAL AND PSYCHOLOGICAL IMPACT

The transiting of drugs through any given country means that some of it unavoidably stays, either as payment or as a profit for the drug traffickers. Drugs thus will be, consumed locally, with the dire effects on consumers. In a poor Neighborhood, the disruptive effect on family and society is, multiplied and magnified. Addiction sets in and the afflicted persons become a huge burden. They will steal to feed their habit, often from other family members. They may use violence if necessary to obtain cash, or simply because they become frustrated and angry. A cycle of dependency, distress, poverty and crime sets in. It becomes a major internal Security and Public Health issue in the neighborhoods.

3.2.2   HEALTH AND EDUCATION

These manifest in the individual's health -ill health, sickness, physical weakness, emotional and psychosocial defects and, ultimately death. Particularly devastating to an abuser's health is the contraction of needle borne illnesses including hepatitis and HIV/AIDS through injection drug use and some case 'mental disorder'. The implication of STD's and HIV/AIDS transmission through unprotected sex with prostitutes puts not just them at risk, but the society from which their 'clientele' is, sourced. School attendance rates go down, while dropout rates rise. The idea of get rich quick syndrome; an illusion shared by many; only to live to regret. As a result, they end up as unskilled, unemployed and unproductive citizens, a burden to society. The illiteracy rates for young persons in Africa remain high, and the drug culture amplifies it even more. In the end, they repeat the cycle through their own children. This cycle needs to be broken.

4   ORGANIZED CRIMES IN AFRICA

Worldwide, organized crime is, considered a major threat to human security. It hinders social, economic, cultural, and democratic developments. The threat and challenges of organized crime in Africa is enormous because of the high presence of 'weak nations' serving as potential 'breeding grounds' for such activities (Commission of the European Communities, 2007). In Africa, as in the rest of the world, organized criminal activities take the form of drug trafficking, advanced fee and

Internet fraud, human trafficking, diamond smuggling, forgery, illegal manufacture and trafficking of firearms, armed robbery and the theft and smuggling of oil (Aning, 2007). An infamous case of organized crime in Colombia of the South America; Pablo Escobar, controlled the Colombian Medellin and Cali cartel from the 1980s until his premature death from escape from the authority in 1993. It is, acclaimed that the judges assigned to his case, decline to hear the case for fear of possible assault and death. When he was indicted in November 1986 for racketeering and smuggling of over 60 tons of cocaine into Miami, Colombian judges, after receiving a series of threats from his associates,' refused' to extradite him; the charges against him were subsequently dismissed and he went free. Escobar for his security and self-preservation bought his election into the Colombian Congress; this gave him the opportunity to protect his criminal network as well as providing him with immunity. Apparently, Escobar became popular because of the largesse he gave to his people. He is, acclaimed to have rendered many community services, such as the construction of hospitals, low-cost houses and many other community services in Colombia. Here, organized crime simply exploited the vacuum created by government's inability to provide certain services and protection for the citizenry. The 2008 World Drug Report, released in Nairobi, indicates that an upsurge in supply and the development of new trafficking routes, mostly through Africa, could eventually strengthen drug demand in developed countries. This, it adds, will see the creation of new markets for some of the world's deadliest substances. Organized Crime controls the markets and the distribution, including transportation of the drugs to markets. It also handles the revenue derived from the illegal trade.

4.1   DRUG TRAFFICKING

Some of the effects that drug trafficking can have on the continent is far from minor, and the results have been devastating to the extent that in many cases, development has been stunted, stalled or has even regressed in some places. The apparent short-term gains are illusory, because the lasting damage far outweighs them all. Drug trafficking is all about moneymaking and instant wealth; tracking and seizing that money is by far the best defense against the drug trafficking phenomenon.

5   THE EFFECT OF POVERTY IN AFRICA

African nations have low income per capita, despite a wealth of natural resources. About 30% poor live in urban area while about 70 per cent of the continent's poor people live in rural areas and depend on subsistent agriculture for food and livelihood. The prevalence of poverty in Sub-Saharan Africa is rising faster than the population. Urban Poverty according to the Copenhagen, resolution (2000) is strongly associated with high levels of environmental risk. This is largely due to poor quality and overcrowded housing conditions and the inadequacies in provision of water, sanitation, drainage, health care, garbage/waste collection, poor percolation resulting into flood, building on waterways and pollution of land, air, and water. The pace of poverty alleviation in most of Africa Nations has slowed since the 1970s. The percentage of people living below the national poverty line varies dramatically, from more than 6 per cent in Tunisia to nearly over 90 per cent and 87 per cent in Somalia and Sudan respectively. Beginning in the late 1970s, Nations such as Egypt, Nigeria, Kenya, and some other African Nations undertook structural adjustments programs with the aim of reducing poverty. One in five African, live in a nation affected by civil conflicts. Poverty has become the mainstay of many African nations such that her people have become victims of lacks in basic needs of life. The cause for this situation is, attributed to bad governance, greed, lack of integrity and vision of political leadership on the continent. Adiukwu, F.O (2014) affirms that movement of people to cities affects the capacity to cope, as each additional person increases the demand on the infrastructure and the natural system and as result creating ecological imbalance with adverse environmental penalty in hazards and disaster. The urban poor need better conditions for their work, better infrastructure and services, and good urban governance.

6   RECOMMENDATION

Africa's youth is hope for future economic prosperity, thus current policies and programs need to enhance their opportunities. Accelerating poverty alleviation and sustaining human development improvement are important challenges for Africa that need solutions. The Assembly of the African Union, at the Third Extraordinary Session on "Employment and Poverty Alleviation" held 8 – 9 September 2004, Ouagadougou, Burkina Faso, against the backdrop of deepening poverty, widespread unemployment, and underemployment afflicting the majority of Africa; adopted action plans for effective implementations and followed up on poverty alleviation by the Heads of States and Governments of Africa. However, ten years has gone by, still evidence shows that the fight against poverty in Africa has not been successful. The followings are suggested alleviative mechanisms:

- Enhance youth entrepreneurial skills acquisitions, and employment opportunities.
- Psychological treatment is necessary for prostitutes and drug abusers, for purpose of reformation.
- The fight against corruption must, be sustained.
- Government must encourage youths' participation in programs that are, directed at them.
- Improve the quantity and quality of schools; expand school enrollments, especially for girls.
- Good governance and accountability at all level of administration.
- Drug and alcohol addiction treatment and health care must be integral to programs offered to people escaping prostitution and drug abuse.

7 CONCLUSION

Prostitution is a way of survival for women involved; several of urban Africa's youths, gets into drugs to escape, the harsh reality of living in poverty, and as a means of survival engage in prostitution, drug addictions and related offences. The view of Many scholars and researchers and shared by authors is that the key policy actions needed throughout Africa are those that expand youth opportunities. This gives them the skills to participate in the economy and public life, and thus survive the difficulties of everyday life. Urban Africa needs to evolve and sustain public education and programs, aimed at skills acquisitions, and create employment opportunities that offer options for escape and thus promote healthy behaviors and lifestyle. An appropriate educational system and strong economic management will make it possible to absorb the large generation of African youths into the workforce.

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Client's Perception of Quality of Health Care Under the National Health Insurance in a District Hospital in Ghana - A Cross-Sectional Study

Peter Twum[1], Lingzhong Xu[2], Lesego Selotlegeng[2], and Yangyang Cheng[2]

[1]Department of Social Medicine and Health Services Management, School of Public Health, Shandong University, Jinan, China

[2]Department of social medicine and health management, school of public health, Shandong University, Jinan, China

ABSTRACT: *Background:* Ghana's pursuance of extensive reforms of her health care system to improve access, increase efficiency and ensure quality dates back to the colonial era. The recent attempt made to achieve this is the introduction of National Health Insurance Scheme (NHIS) which has resulted in the increase of health care utilization. The aim of this study is to find out how this increase has affected client's perception of quality of health care delivery in Ghana under the NHIS.
Method: A cross-sectional survey was used to assess client perception of quality under the NHIS. In a bid to gather information on fresh client experience at the hospital, exit interview was conducted using structured questionnaire. Moreover, at the point of service delivery, observation was utilized to collect data on customer and service provider interaction.
Results: Albeit the service delivery fall short of the Ministry of Health (MoH) quality standards, most of the patients were satisfied. Regarding health facilities, clients need to be educated on their entitlement especially by health insurance schemes, on what they are entitled to whenever they visit health facilities.
Conclusion: Generally, the introduction of the NHIS has resulted in increased level of utilization of health services utilization, however this has not been reflected in the quality of service delivery. Since the patients are not aware of their entitlements, they are unable to harvest the maximal benefits of the services.

KEYWORDS: Patient, Perception, Quality, Health Insurance, Healthcare.

1 BACKGROUND

An important health outcome correlation is income, both at the disaggregated and at the aggregate levels. The link from health to income can also be important, as evidenced by the economic impact of AIDS in Africa [1]. Meanwhile health service of inferior quality does not promote equity or maximize health gain. According to Crosby et al, quality is doing things right the first time [2]. Zeimenthal et al suggest that service quality is the extent to which the users' perception of the service exceeds their expectations [3]. The World Health Organization (WHO) has identified six dimensions of health care quality as; effective, efficient, accessible, acceptable/patient-centered, equitable and safe [4].The history of quality assurance in Ghana could be traced back to Regional Directors of Health conference held in 1989 on ways of improving quality of health care delivery in the country. In Ghana the Ministry of Health (MoH) quality standards looks, among other things, at availability of required number of skilled personnel, equipment, quality assurance team, activities undertaking to ensure quality such as patients satisfaction survey, client complaint management-designated place, client feedback such as suggestion box, fencing of the facility, security post, open space for packing, waiting time, place of convenient and availability of drugs [5].

Several approaches to finance health care have been experimented and adopted in different countries in diverse ways. One of such approaches is social health insurance which is always introduced against a background of existing attitude and traditions in the provision of health services. For instance in a place where health services have been provided free at the point of use, there may be resistance when changing to a system where payment is more visible. On the other hand where

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people have been paying for a service at the point of use, changing to the former is likely to be embraced. The method of financing health care therefore determines its accessibility, affordability and utilization [6].

Financing health care in Ghana has gone through some stages. The first national government revamped the health sector by enlarging and modernizing facilities [7]. As a result Ghanaians could seek medical care in any government hospital as well as health centres and pharmacy stores free of charge [8] .It has been suggested that between 1957 and 1963 the number of health centres increased from 1.0 to 41 and of the £144 million that government budgeted, between 1963 and 1964, for projects, as part of public expenditure, about 31 % went towards the social services with much attention given to the health sector [9]. Also government's health expenditure increased from 6.4% in 1965 to 8.2% in 1969 [10].

The quality of health care began to decline in the late 1960s, because subsequent governments failed to invest in the health care system [11]. Upon adoption of the International Monetary Fund's (IMF) and World Bank's Structural Adjustment Program (SAP), the government was charged to reduce expenditure drastically on social services including health and as a result, the full burden of paying for health care was borne by patients. Government expenditure on health was therefore reduced from 10% of the national budget in 1982 to 1.3% in 1997. Many people could not afford to pay the requisite fees at point of delivery to seek medical attention, they then avoided going to hospitals and health centers instead, they engaged in self-medication or other cost-saving behaviors or practices [12]. It has been established in literature that utilization of health services in Ghana was reduced during this period [13] [14] [15, 16].

In order to remove the financial barriers for Ghanaians to access healthcare services and to ensure equitable access to quality services especially by the poor and vulnerable in society, the government of Ghana initiated and passed the National Health Insurance Scheme (NHIS) Law, 2003 (Act 650) and the National Health Insurance Regulations, 2004 (L.I. 1809) aimed at abolishing the 'Cash and Carry' system and limiting out-of-pocket payments at the point of service delivery [6, 17, 18]. The NHIS is financed from four main sources:1 a value-added tax on goods and services, 2 a reserved portion of social security taxes from formal sector workers, 3 individual premiums, and 4 miscellaneous from investment returns, Parliament and donors. The 2.5% tax on selected goods and services, called the National Health Insurance Levy (NHIL), is by far the largest source, comprising about 70% of revenues. Social security taxes account for an additional 23%, premiums for about 5%, and other funds for the remaining 2% [19].

Just as it has been reported by other studies about the effects of Mutual Health Organizations (MHO) on the health service use, outpatient utilization of healthcare services increased over forty-fold from 0.6 million in 2005 to 25.5 million in 2011as the result of the introduction of the NHIS [20-24]. During the same time, inpatient utilization also increased over fifty-fold from 28,906 to 1,451,596 in 2011 [19]. Although Gumbre in 2001 found that MHO members were less likely than the non-members to seek care when ill [25].

 This study is therefore designed to assess the client's perception of quality of health care delivery under the NHIS at the Atwima Mponua District Hospital in Ashanti Region of Ghana.

2   MATERIALS AND METHODS

2.1   PROFILE OF THE STUDY AREA

 The study was conducted in the Atwima Mponua District which is located in the south-western part of the Ashanti Region covering an area of approximately 894.15 square kilometers with Nyinahin as its capital town. Health delivery in the district is through eight government and six non-government facilities; one Hospital, five Health Centers, two Clinics and five Maternity/Child Health. In addition, outreach clinical activities are organized in some communities by the District Health Directorate from the district hospital at Nyinahin. The district has one Medical Officer, two Medical Assistants, five Mid-wives, twenty Enrolled and Community Health Nurses and 110 Traditional Birth Attendants providing health services in the public health facilities. Their efforts are complimented by one Medical Assistant, five Mid-wives, one Laboratory Technician and two Nurses in private health facilities.

2.2   STUDY DESIGN AND SAMPLING

 A cross-sectional survey was used to establish the relationship between increase in the utilization of health service and clients perception of quality of health care delivery under the NHIS. A sample size was calculated based on the district population as well as using the percentage of the number of people who had registered with the scheme at the national level which was 52% as the proportion. As a result, 384 respondents were to be interviewed based on 95% confidence level using exit interview questionnaire. This number was rounded to 400. Purposive sampling technique was used to select key

informants for interview and simple random sampling technique was also used to select people who were leaving the Hospital after consultation for exit interview.

2.3 DATA COLLECTION

Exit interview was used to gather information on the fresh customer experience at the hospital.

Observational checklist was also used to collect data on customer- service provider interaction at the point of service delivery. It was again used to assess the ministry of health quality standards at the hospital. Following training of field workers, the questionnaire was pre-tested at the Nkawie Government Hospital in the Atwima Nwabiagya District which shares boundary with the study district.

This was done to ensure validity, reliability and to check ambiguities. The choice of the Atwima Nwabiagya District was informed by the fact that it had similar characteristics as that of the study district. The pretest revealed some weaknesses in the questionnaire which were subsequently addressed before its application on the field. Filled questionnaires were numbered and checked for completeness, clarity and consistency at the end of interview. Data was cleaned up and irrelevant materials sorted out.

2.4 DATA ANALYSIS

The data was analyzed using Microsoft Excel 2007 edition. Descriptive and inferential statistics were used to describe and make inferences from the data where applicable. The findings were presented in tables, graphs and charts.

2.5 ETHICAL CONSIDERATION

The study was approved by the Committee for Human Research and Publication, School of Medical Sciences, Kwame Nkrumah University of Science and Technology.

A verbal consent was used to seek the consent of respondents before they were interviewed. This was informed by the fact that the research did not present risk of harm to respondents and involved no procedures for which written consent is normally required outside of the research context. They were however assured of the confidentiality of their response and the null association of it to them now or in the future. In addition, they were assured that their participation would not affect their relations with the hospital now or in the future and that refusal to participate would not attract any penalty.

2.6 LIMITATION

The instrument may be limited in determining the anthropological details in relation to the use of health services considering the limited use of qualitative tools. However; this was minimized through extensive interview. Further, the use of local language (Twi), may have led to misunderstanding or misinterpretation of the import of the set questions and therefore lead to inaccurate results. These limitations were however mitigated through training of field workers for standardization of the interpretation of the questions and through close monitoring by researcher of the data collection process.

3   RESULTS AND DISCUSSION

3.1   BACKGROUND CHARACTERISTICS OF RESPONDENTS

Table 1. Background characteristics of respondents

	N=400 Frequency	(%)
Sex		
Male	184	(46)
Female	216	(54)
Educational level		
Never	116	(29)
Basic	180	(45)
Secondary	84	(21)
Tertiary	20	(5)
NHIS Status		
Registered	282	(70.5)
Not registered	36	(29.5)
Payment mode before NHIS		
Out of pocket	340	(85)
Family	60	(15)
Others	-	(-)
level of health care usage		
before	64	(16)
after	336	(84)

Source: Field survey, 2008.

3.1.1   SEX DISTRIBUTION

Majority of the respondents 54% (216) were females and 46% (184) were males. Most of the respondents 45% (180) completed basic school (Junior High School), 29% (116) have never been to school, 21% (84) and 10% (20) completed secondary school and tertiary respectively..

3.1.2   NATIONAL HEALTH INSURANCE STATUS

Again 70.5% (282) which represents the majority of the respondents have registered with the NHIS and the remaining 29.5% (36) have not registered with the NHIS

3.1.3   HOW PEOPLE PAID FOR HEALTH SERVICES BEFORE NHIS

It was discovered that 85% (340) paid for their hospital bills out of their pocket prior to the advent of the NHIS whiles 15% (60) had their family members paying their hospital bills for them.

3.1.4   LEVEL OF UTILIZATION OF HEALTH SERVICES BEFORE AND AFTER NHIS

The level of utilization was higher among 84% (336) after the introduction of the NHIS and 16% (64) used to visit hospital more regularly before its introduction.

Table 2 : Clients Satisfaction

	Frequency (%)	
Waiting time		
Satisfied	288	(72)
not satisfied	112	(28)
Availability of drugs		
Available	336	(84)
not available	54	(16)
Understanding of drug regimen		
Understood	312	(78)
Not understood	88	(22)
Service satisfaction		
Satisfied	353	(88.25)
not satisfied	47	(11.75)
Client assessment of staff		
Very good	276	(69)
Good	111	(27.75)
Poor	13	(3.25)

Source: field survey, 2008

3.1.5 AVAILABILITY OF DRUGS AND UNDERSTANDING OF DRUG REGIMEN

Most respondents 84% (336) had all their prescribed drugs from the hospital however 16% (64) did not get all their prescribed drugs from the hospital. The number of respondents understood the drug regimen were the majority 78% (312) and 22% (88) did not understand it as shown in the table 2 above.

3.1.6 SERVICE SATISFACTION

The number of respondents who were satisfied with the services rendered to them was 88.5% (353) but 11.75 (47) were not satisfied. Concerning the workers attitude, 69% (276) of respondents graded it as very good, 27.75% (111) good and 3.75% (13) graded it as poor.

3.2 QUALITY STANDARDS

Using the checklist it was found that the hospital has vacant security post. Also there was vacant client complaint desk, inadequate directional signs, long waiting time in a narrow and dark space. Again there was an untrained quality assurance team.

4 DISCUSSION

The sex distribution in the district was 54% (216) for females and 46% (184) for male 184. This is in line with Turkson [26], who reported that majority 70% of respondents were females. Again the figures were not so much different from the national one. The national figures as against district are male 49 at national and 46 at the district and 51 at national and 54 at the district level for the females. This will make it easy for national health policies to be easily replicated in the district.

The level of utilization of health services went up after the introduction of the NHIS compared to before as 336 representing 84% of the respondents indicated that they visit the hospital more frequently after the introduction of the NHIS as against 64 respondents representing 16% who used to visit hospital more regularly before the advent of NHIS. Studies have revealed that, uninsured individuals are more likely to forgo preventive care and treatment. Also being a member of MHO is associated with higher utilization of modern health care in the form of out-patient visit or hospitalization [20, 21] Agrey and Appia also reported that majority of subscribers accessed healthcare with their NHI cards [27] .Although Gumbre in 2001 found that MHO members were less likely than the non-members to seek care when ill [25].

Concerning the workers attitude majority, 68.5% of respondents graded it as very good, 27.75% good and 3.75% graded it as poor. This supports Agrey and Appiah findings that most clients rated the general attitudes of staff as good [27] however Turkson reported that participants perceived poor attitude of health workers during a focus group discussion [26].

The hospital had only one medical doctor who was seeing an average of 120 patients per day instead of 40. As a result, patients who were supposed to wait for 20 minutes before seeing a doctor took over 60 minutes [28]. Again Turkson also reported among other things that long waiting times and inadequate staff are detrimental to effective delivery of quality healthcare. Ro Strasser find that all countries face the challenge of shortages of doctors and other health professionals in rural and remote areas [29].There was an untrained quality assurance team. Also there were directional signs but inadequate, vacant security post, incomplete fence, vacant client complaint desk which means patients will find it difficult and possibly frustrating to lodge complaints, long waiting time in a narrow and dark space, lack of (x-ray) imaging facilities and insufficient toilet facilities. Most respondents 84% (336) had all their prescription drugs from the hospital respondents representing 16% (64) did not get all their prescription drugs from the hospital. This is a pitfall to client satisfaction as explained by the Treasury Board of Canada Secretariat in 1991 that not meeting publicized standards will result surely in client dissatisfaction [30].

In assessing client's understanding of drug regimen, they were asked to repeat the instruction of the dispensary officers on how they should take their drugs. The number of respondents who showed that they understood the drug regimen was out of 400 representing 78% (312). This number could be attributed to the high literacy rate in the district. But 22% (88) did not understand it, although in percentages those who did not understand the prescription look small yet in terms of real numbers 88 is significant.

As reported in other studies [26, 27] majority of the respondents 88.25% (353) , were atisfied with the service received while11.75% (47) were not satisfied. This means that most of the clients were satisfied with the services rendered to them at the hospital. Among the reasons could be that they really had better service from the hospital. Another could also be that they are not well informed as to what they are entitled to and therefore have no choice than to appreciate whatever service at their disposal. This worth being studied further as it stands.

5   CONCLUSIONS

In this study, it has been shown that the introduction of the NHIS has resulted in increased in the utilization of health services. Although the service delivery falls short of the MoH Quality Standards, most of the clients were satisfied with the services rendered to them at the hospital.

This mean that the way clients perceive health care quality is different from the technical quality standards spelt out by the health ministry. Patients' assessment of quality depends mostly on the altitudes of workers and availability of drugs. This could be attributed to the fact that patients may have less or no information about what they are entitled to when they visit hospital. It is therefore recommended that patience should be educated, especially by the national insurance scheme, on what they are entitled to whenever they visit any health facility.

AUTHOR'S DETAILS

Department of Social Medicine and Health Services Management,School of Public Health, Shandong University. P.O. Box 110 , 44 Wenhuaxi Road, Lixia District, 250012, Ji'nan, China.

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The management and disposal of small scale sawmills residues at the Sokoban and Ahwia wood markets in Kumasi – Ghana

Bernard Effah[1], Kwaku Antwi[2], Ernest Boampong[1], Jack Nti Asamoah[3], and Osei Asibey[1]

[1]Department of Interior Architecture and Furniture Production, Kumasi Polytechnic, Kumasi-Ashanti, Ghana

[2]PhD Student, Department of Construction and Wood Technology Education, University of Education-Winneba, Kumasi Campus, Kumasi-Ashanti, Ghana

[3]Department of Civil Engineering, Kumasi Polytechnic, Kumasi-Ashanti, Ghana

ABSTRACT: This research assessed how small scale sawmills residues at Sokoban and Ahwia wood markets are managed and disposed off and suggested appropriate measures for dealing with the situation of waste disposal at these industrial estates. The study was conducted at two local timber markets in Kumasi and its environs in the Ashanti region of Ghana. The study was a descriptive social survey design which sought to portray an accurate profile of persons, events and situations. To harness the needed information, a triangulation method comprising of questionnaire, interview and observation/photography methods were employed in gathering data. For primary data collection, systematic random sampling method was used to select a realised sample of 208 respondents from an infinite population comprising of wood processors, carpenters and timber sellers from the areas under survey. The study showed sawing and planing as the highest waste generation sources. Sawdust was the highest waste generated by the artisans while majority were also collecting their waste by manual clearing. The artisans have also resorted to open burning as the means of disposing their waste. There was general assertion that state authorities were not doing enough to manage waste at the surveyed sites. A significant positive correlation between methods of collecting waste and methods of disposal practiced were identified. Ideally, the easiest and most cost-effective way of managing any waste is not to generate it in the first place. Reassessing daily practices and overall product design of the artisans may significantly reduce the amount of wood waste they discard.

KEYWORDS: Sawdust, waste management, timber market, open-burning, pollution.

1 INTRODUCTION

Ghana is a country with a warm equatorial climate endowed with vast natural resources of all kinds for the social and economical aspirations of its citizens. Ghana's timber industry contributes 4.0% of GDP and happens to be the third largest foreign exchange earner for the country [1]. Presently, Ghana is confronted with a number of serious environmental challenges among which are land degradation, coastal erosion, pollution of rivers and lagoons, deforestation, desertification and waste management [2]. The issue of solid waste management has become a major problem at global, regional and local levels and one of the difficult issues for local authorities in urban centers in Ghana [3]. As a nation, the net effect of waste borders on concerns such as health, sustainable development, climate change and environmental protection. Industrial activities and urbanization for a developing country like Ghana has gradually led to the deterioration and contamination of the natural environment in modern years.

As the demand for wood and its products increase, the volume of wastes being generated is enormous and cannot be increased [4]. One of the utmost environmental problems is how to dispose properly, the waste being generated daily by the ever increasing activities of small scale sawmills. The timber industry is challenged with low recovery rate leading to waste

and the loss of almost 70% of the raw material [1]. In the UK, the cost of waste account for 5% of turnover in the furniture manufacturing sector and the reduction, reuse and recycling initiatives generated savings to the tune of 10% profits [5]. The UNEP is also optimistic of the considerable climate benefits that could be achieved through improved management of wastes [6]. According to UNEP [6], the informal waste sector contribute significantly to resource recovery and green house gases savings in cities of developing nations, however, this contribution is normally ignored.

Saw mills by nature generate a lot of wastes like sawdust, wood offcutts, wood rejects, chips, wood shavings, and bark [4]. The problems posed by these wastes are many: they degrade the urban environment, reduce its aesthetic value, produce offensive odours during the rains and pollute the air with smoke when the wastes are burnt uncontrollably. They also constitute health hazards in themselves if they are not timely disposed as they become breeding places for worms and insects [4], [7]. Accumulating hazardous waste on site can pose a threat to human health and the environment [8]. A waste is any solid, liquid, or contained gaseous material that is discarded by being disposed of, burned or incinerated, or recycled [8]. Waste generation by itself impacts negatively on the climate, nonetheless the treatment and disposal of waste can have both positive and negative impacts on the climate [6]. The inability of the small and medium sawmill sector to perform effectively has resulted in high wood residue production, which is inversely related to the output of lumber yield. Wood residues include a large spectrum of wood products from primary and secondary processing such as bark, slabs, sawdust, chips, planer shavings, sander dust, end trims, used pallets, and construction residues [9]. Nielsen et al. [10] identified three main wood waste streams; harvesting residues, wood processing residues and wood waste going into landfills. They further argued that the main stakeholders for wood waste utilization are the wood processing industry, the waste management sector and the energy sector.

There are various products that can be derived from wood wastes and yet still wood residues are often spilled on open spaces, sometimes occupying lands for development. Likewise, they also constitute bad working environment for those working in the area, due to accumulation of wastes over a period of time most especially during raining season. Wood residue leachate contains high concentrations of natural organic material which can mobilize metals such as Iron from soils [11]. Threats to forests due to adverse effect of climate change could be effectively tackled by increasing the use of wood residues [12].

The situations of waste disposal in Ghana are similar to those of her fellow developing countries within the tropical climates [13]. In Ghana, majority of landfills are open dumps, even though these are strongly discouraged in the national sanitation policy. Ghana's first sanitary landfill facilities were commissioned in Accra, Kumasi, Sekondi-Takoradi and Tamale between 2003 and 2004 [13]. In Ghana, the issue of collection, management and disposal of solid waste continues to feature prominently across the country. It is clear that the inability of state authorities to systematically manage waste and especially wood residues is presenting challenges such as the contamination of water bodies leading to the spread of water-borne diseases, health hazards from the stench emanating from uncollected and decaying garbage, air contamination, garbage-chocked drains and gutters, irresponsible disposal of refuse at our industrial areas and others. Recently, the problem of sanitation has assumed increased prominence as a political issue especially in urban areas leading to the introduction of a by-monthly national sanitation day. Saw dust is a major air pollutant as well as a source of smoke from burnt wood waste [14]. This research assessed how small scale sawmills residues at the Sokoban and Ahwia wood markets are managed and disposed off and suggested appropriate measures for dealing with the situation of waste disposal at these two industrial estates.

2 MATERIALS AND METHODS

2.1 STUDY AREAS

The study was conducted at two local timber markets in Kumasi and its environs in the Ashanti region of Ghana. Kumasi is located in the transitional forest zone and is about 270km north of Accra. It is between latitude 6.35^o-6.40^o and longitude 1.30^o-1.35^o, and covers a total land area of 254km^2 and has an elevation ranging between 250-300 meters above sea level. Precisely, the Sokoban wood market located at Sokoban on the outskirt of the Kumasi Metropolis and the Ahwiaa timber market in the Kwabre District. The Sokoban Wood Village is a conglomerated wood industry made up of micro, small, and medium-scale firms which produces all kinds of wood products ranging from household furniture to office furniture [14]. The Ahwiaa timber market on the other hand is at the heart of Ahwiaa, a small town located on the main Kumasi-Mampong highway, about 14 kilometers north of Kumasi in the Kwabre District of Ashanti region. These two timber markets are very important centers for wood processing and two of the main wood markets in the country. The markets are run by small scale saw millers, lumber brokers and artisans who obtained their wood stocks from sawmills and chainsaw operators. The main

activities are sales of lumber and secondary and tertiary processing of lumber. The timber markets are communities that house lumber brokers, carpenters and other woodworkers, with economic activities ranging from the sale of food, wood and wood products as well as accessories for wood work and financial institutions.

2.2   RESEARCH DESIGN AND DATA COLLECTION

The study was a descriptive social survey design which sought to portray an accurate profile of persons, events and situations as well as describe the distribution of phenomena in a sample and population [15], [16]. The survey strategy is usually associated with the deductive research approach and mostly used to answer who, what, where, how much and how many questions [17]. Surveys also provide an effective way of describing the more objective characteristics of a population [16]. To harness the needed information, a triangulation method comprising of questionnaire, interview and observation/photography methods were employed in gathering data from the respondents. For primary data collection, systematic random sampling method was used to select a realised sample of 208 respondents from an infinite population comprising of wood processors, carpenters and timber sellers from the areas under survey. This was due to the impossibility of covering the whole population and also to give credibility to the study.

Closed ended form of questionnaire of 30 items was designed to elicit information from the respondents. The questionnaire was categorized into six main theme headings. Section A contained issues on waste generation sources. Section B elicited information on the type of wood waste that was generated by the respondents. Section C contained information on the means of collecting the waste generated. Whiles section D asked of issues on the method of waste disposal practiced by the artisans. Sections E and F enquired about the wood waste management system practiced and the involvement of state authorities in waste management respectively at the timber markets. All the section required the respondents to indicate Yes or No to the statements provided under each item. Personal interviews, participant observation and desktop study were conducted to buttress the information generated from the questionnaire. In all forty people were interviewed. Photography was used to capture important scenes of the study and to strengthen evidence of observed events. All the methods focused on the sources of waste generation, types of waste generated, means of collecting the waste, methods of waste disposal, waste management systems, authorities' involvement and the way forward. The data obtained from all the sources were evaluated using correlation test, content analysis, descriptive statistics and graphs.

3   RESULTS AND DISCUSSION

From the analysis, the survey indicated categories of the respondents to be 60 (28.8%) wood processors, 102 (49%) carpenters and 46 (22.1%) timber sellers.

3.1   WASTE GENERATION SOURCES

Wood waste residue is generated from a variety of sources and production processes, including sawing, planing, mortising, lathe turning, and sanding. Result from the study (Figure 1) shows sawing and planing as the highest waste generation sources. Majority of the respondents also had mortising as their source of waste generation. Sanding and lathe turning were the sources of waste generation for some minority of respondents. Ideally, the best way to deal effectively with waste is to reduce it at the source and after that find potential use for the waste generated.
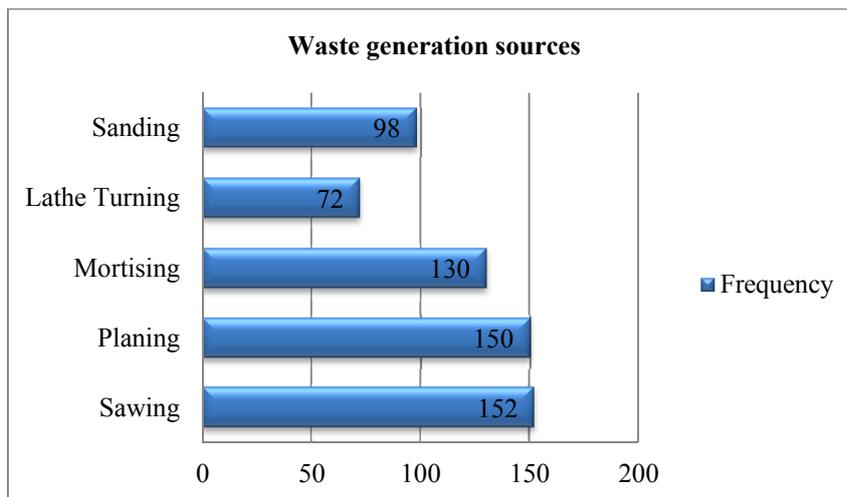
Figure 1: Waste generation sources

3.2 TYPE OF WOOD WASTE GENERATED

Figure 2 shows the type of wood waste that is generated by the respondents. Sawdust was the highest waste generated. This was closely followed by shavings as the second type of waste generated. With frequencies of 114 and 110, offcutts and chips were the next forms of waste generated respectively. Sanding powder (74) was indicated by some respondents also as waste type they generate. Bark received the least response (38) as being the last source of waste generated according to the findings of the study.
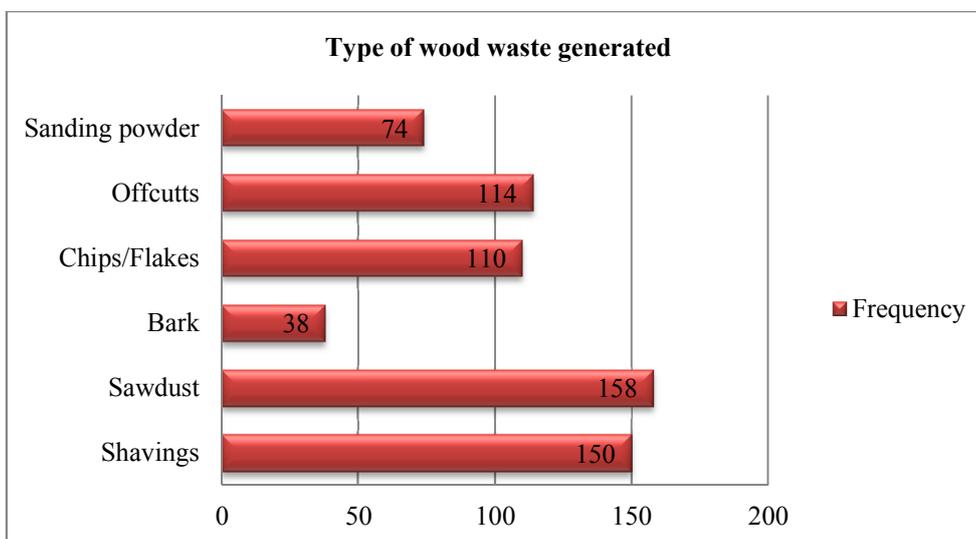
Figure 2: Type of wood waste generated

3.3 WAYS OF COLLECTING WASTE GENERATED

To ascertain the means by which the respondents collect their waste, six ways of waste collecting were put before them to indicate and the result is depicted in Figure 3. Only two respondents were collecting waste by air extraction. Majority (158) collected their waste by manual clearing. Bagging and packaging with sacks is also the collection means by 100 respondents. Ninety-two respondents also use wheel barrow to carry the waste. Carriage by truck and tractor are also practice by 86 and 54 respondents respectively.
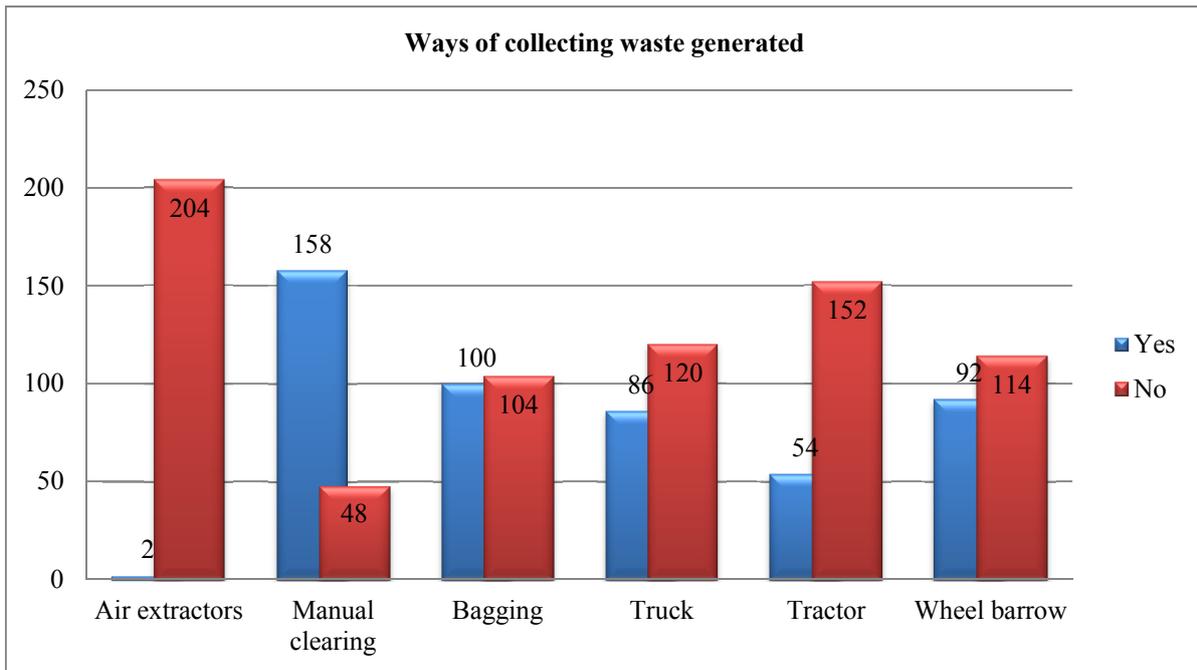
Figure 3: Ways of collecting waste generated

3.4   METHOD OF WASTE DISPOSAL PRACTICE/AVAILABLE

Figure 4 is the results on the method of waste disposal practiced at the study sites. The collection by households was confirmed by 88 respondents. Collection by poultry farmers accounted for 102 respondents. The highest response (152) was practicing open burning. Open pits and open dumping also scored 88 and 98 respectively. There are some wood waste management practices aimed at reducing the impacts of sawmill wood wastes at the study sites. Some artisans have tried to reduce the volume of wood waste by on-site storage or disposals. Possible solid waste management practices includes collection, recycling, solid waste disposal on land, treatments as well as incineration and open burning of waste. Lack of transportation to transport the waste from the site to designated safe places has led to majority resulting in opening burning just at the sites.
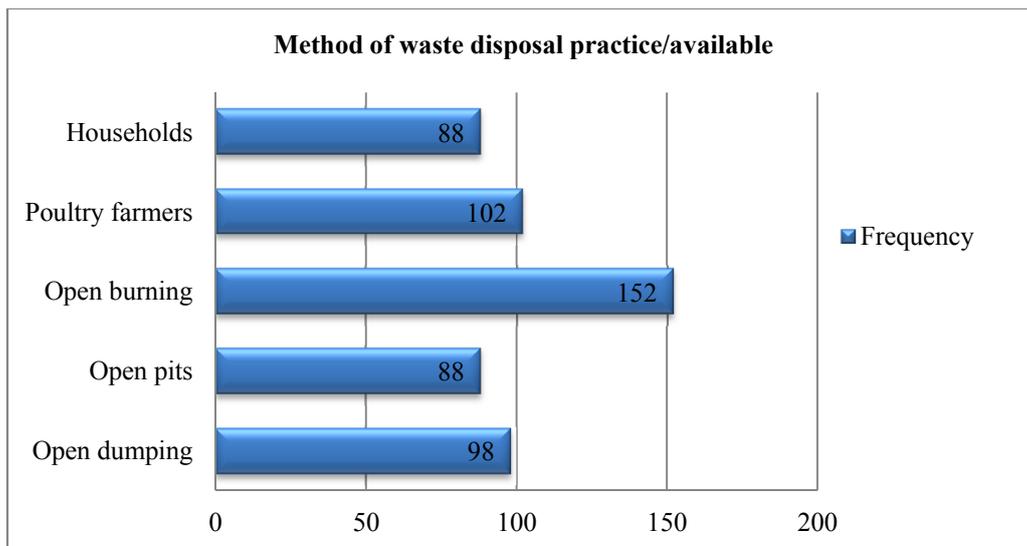
Figure 4: Method of waste disposal practice/available

3.5   WOOD WASTE MANAGEMENT SYSTEM PRACTICE/AVAILABLE

There is various waste management system that could be put in place to management waste effectively. However, in a developing country like Ghana, very few are practiced. The results on the waste management system available and practiced are shown in Figure 5. Landfill site is available and practiced by majority (110). Incinerator/combustion, treatment plant and recycling are utilized by some few minorities of 24, 24 and 28 respectively. Bedding is practiced by almost half of the respondents. Ideally, the easiest and most cost-effective way of managing any waste is not to generate it in the first place. But once the waste is generated, one can decrease the amount of waste produced by developing a few "good housekeeping" habits that could save businesses money and prevent accidents and waste as prescribed by EPA [8]. When waste has been minimized at the source, consideration must be given to its potential reuse. This means reprocessing the waste to manufacture composite boards, animal bedding, mulches, charcoal and generation of energy.
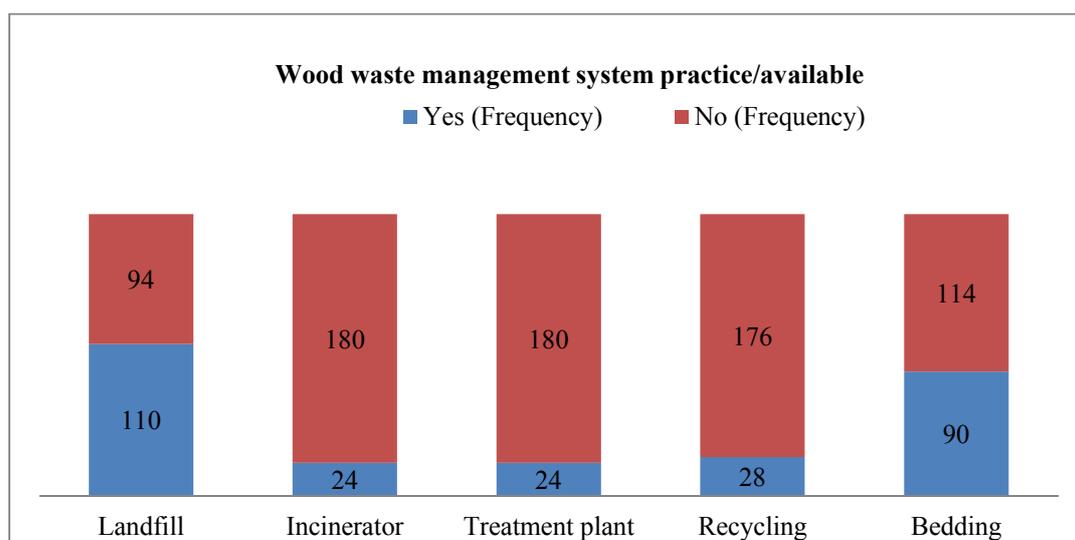
Figure 5: Wood waste management system practice/available

3.6   INVOLVEMENT OF STATE AUTHORITIES IN WASTE MANAGEMENT

To know the efforts of state authorities in dealing with waste management at the study sites, three statements were posed to the respondents. Majority of the respondents (55.8%) are aware of some regulations relating to the disposal of the waste they create. Half of the respondents agreed on their awareness of the consequences of the waste generated at the timber markets, whiles the other half are not in the known of the consequences of the waste they generate. However, majority (64.4%) assert that state authorities are not doing enough to manage waste at the surveyed sites. Combination of these factors has made it difficult to breath because of the stench in the area and the large cloud of smoke in the areas. Table 1 shows the involvement of state authorities in managing waste at the study sites.

Table 1: Involvement of state authorities in waste management

Statement	Frequency (%)	
	Yes	No
Are you much aware of the regulations relating to the disposal of waste in this industry?	116 (55.8)	88 (42.3)
Are you aware of the consequences of the waste generated by activities of this enclave?	104 (50)	98 (47.1)
Are the authorities doing well in managing waste at this enclave?	70 (33.7)	134 (64.4)

3.7 CORRELATION

Pearson correlation measures the extent to which variables vary in the same way. Correlation coefficients range from • 1.0 to +1.0 with 0 meaning no relationship between the variables, and 1.0 meaning a perfect relationship, one to the other. A positive correlation is one in which a higher score on one variable is related to a higher score on the other. A significant positive correlation between methods of collecting waste generated (manual, bagging, truck carriage, tractor carriage, barrow carriage) and methods of disposal practiced (open dumping, open pits, open burning, poultry farmers, households) were identified at $p<0.01$ level and $p<0.05$ level. Table 2 shows correlation between the between methods of collecting waste generated and methods of disposal practiced.

Table 2: Correlation between methods of collecting waste generated and methods of disposal practiced

	Open Dumping	Manual Clearing	Bagging by sacks	Truck Carriage	Tractor Carriage	W. Barrow Carriage	Open Pits	Open Burning	Poultry Farmers
Manual	0.387[**]								
Bagging	0.470[**]	0.451[**]							
Truck Carriage	0.613[**]	0.420[**]	0.593[**]						
Tractor Carriage	0.493[**]	0.276[**]	0.256[**]	0.570[**]					
W. Barrow Carriage	0.356[**]	0.357[**]	0.175[*]	0.190[**]	0.530[**]				
Open Pits	0.514[**]	0.383[**]	0.532[**]	0.543[**]	0.378[**]	0.211[**]			
Open Burning	0.435[**]	0.768[**]	0.394[**]	0.460[**]	0.305[**]	0.402[**]	0.381[**]		
Poultry Farmers	0.612[**]	0.454[**]	0.529[**]	0.658[**]	0.469[**]	0.321[**]	0.558[**]	0.414[**]	
Households	0.435[**]	0.383[**]	0.373[**]	0.383[**]	0.199[**]	0.330[**]	0.365[**]	0.381[**]	0.519[**]

**. Correlation is significant at the $p<0.01$ level (2-tailed).
*. Correlation is significant at the $p<0.05$ level (2-tailed).

Some scenes from Sokoban timber market:(a) mountain of sawdust in a shop (b) bagged sawdust (c) open burning site (d) open burning and dumping site

4   CONCLUSION

A large amount of wood waste is produced in our society by small scale sawmills especially in our timber markets. The issue of wood waste generation and disposal is a common problem in all the timber markets in the country, and unfortunately, this valuable natural resource often ends up taking up valuable landfill space or is burned illegally, negatively impacting the environment. This paper sought to create awareness on minimizing wood waste generation and the realities related to proper disposal of wood waste. It specifically assessed how small scale sawmills residues at the Sokoban and Ahwia wood markets are managed and disposed off and suggested appropriate measures for dealing with the situation of waste disposal at these two industrial estates.

Wood waste residue is generated from a variety of sources and production processes, including sawing, planing, mortising, lathe turning, and sanding. The study showed sawing and planing as the highest waste generation sources. Large piles of wood residue are commonly stored at wood processing facilities. Residues of sawmilling process such as bark, chips, sawdust, shavings and slabs were generated, however, sawdust was the highest waste generated by the artisans. Majority were also collecting their waste by manual clearing. The artisans have also resorted to open burning as the means of disposing their waste. Lack of transportation to transport the waste from the site to designated safe places has led to majority resulting in opening burning just at the sites. There was general assertion that state authorities were not doing enough to manage waste at the surveyed sites. Ideally, the easiest and most cost-effective way of managing any waste is not to generate it in the first place. But once the waste is generated, one can decrease the amount of waste produced by developing a few "good housekeeping" habits. Reassessing daily practices and overall product design of the artisans may significantly reduce the amount of wood waste they discard. A significant positive correlation between methods of collecting waste and methods of disposal practiced were identified. When waste has been minimized at the source, consideration must be given to its potential reuse. This means reprocessing the waste to manufacture composite boards, animal bedding, mulches, charcoal and generation of energy.

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Strategy for Increasing Business Competitiveness of Green Property

Geidy Tiara Ariendi, Arief Daryanto, and Bunasor Sanim

Graduate Program of Management and Business,
Bogor Agricultural University,
Bogor, West Java, Indonesia

The article is a part of Theseus in MB IPB (post graduate program of IPB), Indonesia

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ABSTRACT: The continued development of the business industry makes the green property company must have a specific strategy to increase competitiveness and provide long-term capacity in the face of competition, especially in Pekanbaru city. This study aims to analyze the state of competition within the industry green property facing the company, analyze the internal and external factors affecting the Company's business development in Pekanbaru, and formulate what the main strategies that can be applied to improve the competitiveness of companies in the city of Pekanbaru. There are some alternative strategies that resulted from the analysis of the IFE, EFE, IE matrix, and SWOT analysis is then performed to select a primary strategy QSPM suggested for the Company. The results showed that the main strategies suggested to the Company in order to increase their competitiveness is to open a new project in Pekanbaru. For further research, researchers suggested to do the counting efficiency and effectiveness of alternative strategies generated.

KEYWORDS: competitiveness strategy, green property, IE matrix, SWOT, QSPM.

1 INTRODUCTION

Triggered by a sharp increase in population and the increasing exhaust gas emissions due to human activities since the industrial revolution made the carrying capacity as well as the balance of nature began to decline, the issue of global warming has become the rationale for the entire scientific disciplines. To overcome the problem of environmental degradation, the first United Nations held a conference on the human environment in Stockholm, Sweden in 1972 that resulted in Stockholm Declaration. This declaration called for poverty reduction and environmental protection. Then in 1987, the United Nations Commission on Environment and Development to discuss environmental issues and development that produces documents Brutland report that discusses a concept called sustainable development. At a conference held in 2012, Indonesia through the President expressed commitment to implement the green economy. Understanding the Green Economy by UNEP (United Nations Environment Program) is a subsistence economy that produces human progress and social equality, and a significant reduction of the risk environment and ecological scarcity. This commitment is outlined by the Government through the regulation number 61 of 2011 on the National Action Plan for Reducing Emissions of Greenhouse Gases and regulation number 71 of 2011 on the Implementation of Greenhouse Gas Inventory.

Global warming was initially believed to be a result of the greenhouse effect caused by carbon emissions waste processing plant in developed countries. However, some recent research results indicate that the building sector is the largest energy user sectors (over 30%) in the world (Nelson 2008). Increasing the efficiency of the building is believed to reduce the energy requirements by 85% by 2030. Currently, the construction of environmentally friendly is a new paradigm in the property business (green property). This environmentally friendly property development in accordance with the business terminology "Triple Bottom Line" where the business is not only economic benefits (profit) and social (people), but

also benefit the environment (planet). It takes the role of professionals to instill a correct understanding of the concept of green and how these concepts can affect the real estate market.

Indonesia as a developing country continues to show its existence in the global world. Based on data from the Central Bureau of Statistics Indonesia in 2013 is known that economic growth close to 6% and a total GDP of more than 2 trillion USD makes Indonesia in the group of the 20 richest countries in the world GDP of the sector, in terms of GDP squillion Aires countries, and middle-class income countries in the World . Indonesia's economic condition is getting better it makes the flow of investment continues to flow into Indonesia, one of which is an investment in the property sector. Currently not only Jabodetabek (Jakarta, Bogor, Depok, Tanggerang, and Bekasi), but the growth of investment outside Java is increasing, one of which is the province of Riau. At the exhibition Real Estate Indonesia, held in 2013, there have been transactions amounted to 60 billion dollars in Pekanbaru (Growth 2013).

The average economic growth of Riau in 2012 into the top five in Indonesia that is equal to 5.01%, beating East Kalimantan and North Sumatra. To scale the province, the city of Pekanbaru is the largest contributor to GDP. It is quite reasonable considering the city of Pekanbaru is the capital of Riau province that economic activity is quite large and is the center of circulation of goods and services. The rate of economic growth and development faster than the big cities, the number of people who continue to grow, as well as high purchasing power is the reason Ciputra Group through PT Ciputra Indah open housing CitraLand and CitraGarden in Pekanbaru. It is expressed as Ciputra Group Managing Director, Aaron Hajadi when launching Housing CitraLand Pekanbaru in March 2011 then.

Ciputra Group is a premium property developer Indonesia, which has had more than 30 years with a reputation as a developer of premium residential area and has received awards both nationally and internationally. In 2013, Ciputra Group has a market share of 11%. Ciputra Group is committed to continually produce the best work by promoting innovation, quality, and satisfactory results with the goal of creating a better life for the people. Ciputra Group invests Rp 105 billion in February, 2011 to build premium quality housing in an area of 22 ha with the concept of "Clean, Green, and Modern" in housing CitraLand Pekanbaru. In July 2012, Ciputra Group rebuild housing CitraGarden Pekanbaru with the concept of The Art of Modern Living. Various facilities, facilities, and infrastructure designed with attention to alignment, sustainability, and added value for the occupants. If assessed using GREENSHIP draft indicators for sustainable region drafted by the Green Building Council Indonesia in November 2013, the Ciputra Group housing in Pekanbaru is included into the Bronze. Although not perfectly into a sustainable region, PT Ciputra Indah has tried and will continue to strive to meet the criteria to differentiate the GREENSHIP with each project built.

Green property development business and competitive conditions described above indicate a need for a special study of the strategies that can be used Ciputra Group, particularly PT Ciputra Indah to improve the competitiveness of companies in order to provide long-term capacity for the company in the face of competition in the property green business Pekanbaru. As known from board DPD REI that similar companies such as General Podomoro Group, Summarecon Group, and Trans Corp will soon open a similar project which will affect business competition green property in Pekanbaru.

2 LITERATUR REVIEW

2.1 GREEN PROPERTY

Green property is a concept of development of energy-saving and environmentally friendly in order to improve the quality of the environment as a result of global warming. Themes include green architecture green property and green building. Green architecture is defined as an environmentally conscious architecture that not only includes the main aspects of the architecture (strong, function, convenient, low cost, aesthetics) but also incorporate environmental aspects of a green building that is energy efficiency, the concept of sustainability, and a holistic approach to the environment. The green principles outlined in green property is not just a building, but to the processing of waste, garbage, installation and management of process water and rain water (Research and Development 2013). While the concept of green property expressed by Erdiono (2009) emphasizes increased efficiency in the use of water, energy, and building materials.

The ratio of utilization of space for the building and its environment should be noticed Coefficient Building Basics (KDB) and Green Elementary coefficient (KDH) ranging 40-70% versus 30-60% awoke space for open space that could be utilized green space to breathe and absorb water (Erdiono 2009). The concept of green buildings can be quantified based on ratings through some kind of criteria formulated by the rating agencies green building (Nugroho 2011) through the green certification process. Green Building Council Indonesia (GBCI) is an institution that was founded in 2009. These institutions can issue a certificate for environmentally friendly buildings and an Emerging Member of the World Green Building Council (WGBC), based in Toronto, Canada (GBCI 2014).

2.2   STRATEGIC MANAGEMENT PROCESS

Strategic planning according to Pearce and Robinson (2009) is defined as a set of decisions and actions that resulted in the formulation and implementation of a plan designed to achieve the objectives of a company. David (2007) divides the stage in strategic management into three, namely: (1) Strategy Formulation, (2) Strategy Implementation, and (3) Evaluation Strategy. While Wheelen and Hunger (2012) added the environmental observation in the strategic management process, so that the basic concept of the strategic management process into four basic elements, namely: (1) monitoring the environment (Environmental Scanning), (2) formulation of the strategy (Strategy Formulation), (3) Implementation strategy (Strategy Implementation), and (4) Evaluation and control (Evaluation and Control).

2.3   STRATEGY

The strategy of a company is a unit plan (master plan) which contains about how the company achieves its mission and objectives. There are three types of strategies, namely (1) the corporate level strategy describes the overall direction of the growth of the company and the management of various business and product lines. This strategy must satisfy three main requirements: stability, growth, and savings, (2) business-level strategy is happening at the level of the business unit or product level. This strategy emphasizes on improving the competitive position of products in related industries or market segments of the business units, and (3) the functional level strategy is the approach used in the functional level to achieve corporate objectives and business units by maximizing resource productivity (Wheelen and Hunger 2012).

2.4   INDUSTRY COMPETITION ANALYSIS OF PORTER'S FIVE FORCES

Porter (2007) states that the competition in an industry is influenced by five forces, namely: (1) potential new entrants, (2) Competitors who are in the industry itself, (3) The threat of substitute products, (4) The power of buyers, and (5) The power of suppliers. After understanding the model to analyze the company's overall profit, continued to discuss what strategies will be used by the company in order to have a position that is above average. There are three approaches corporate strategy expressed by Porter, the differentiation approach, a comprehensive approach to cost advantages (cost leadership), and focus.

2.5   RESOURCE BASED VIEW

There are two theories of competitive advantage, which is based on the theory of Industrial Organization called outside-in and the resource-based theory (Resource Based View) is referred to as an inside-out. Resource Based View is a view that suggests that the set of resources and capabilities in strategic and structured, it can improve the competitiveness of the organization (Barney 1991). Barney (1991) divides the resources into three, namely the resources of physical capital, human capital resources, and organizational capital resources. Resources shall include all assets, capabilities, organizational processes, firm characteristics, information, knowledge, and so forth which these resources are in control of the company for the implementation of the strategy in order to achieve effectiveness and efficiency. So that the company can have high competitiveness, the resources of the company must have VRIN concept, is Valuable, Rare, Inimitability, and Non-Substitutability.

2.6   SWOT ANALYSIS

SWOT is an acronym of the strengths, weakness, opportunities and threats. This analysis will show the internal factors of the strengths and weaknesses of the company. In addition, this analysis will also show the opportunities that can benefit companies. In David (2009) explained that there are four types of output from the SWOT strategy, namely (1) Strategy SO or force-opportunities, (2) WO strategy or weaknesses-opportunities, (3) Strategy-ST or the threat of force, and (4) Strategy WT or weakness-threat.

2.7   QUANTITATIVE STRATEGIC PLANNING MATRIX

Quantitative strategic planning matrix or QSPM is a tool that allows the strategist evaluates alternative strategies objectively based on the critical success factors of external and internal previously identified (David 2009). To perform the necessary analysis of data QSPM main factors derived from IFE and EFE Matrix Matrix and alternative strategies from the SWOT Matrix, SPACE Matrix, BCG Matrix, Matrix or IE. However, not all existing alternative strategies should be evaluated by using QSPM. The authors should use a good intuitive judgment to choose which strategy to be analyzed using QSPM.

3 RESEARCH METHOD

3.1 LOCATION AND TIME OF RESEARCH

Location of the study conducted in Housing CitraLand and CitraGarden which is a residential project in the municipality of PT Ciputra Indah Pekanbaru in April-May 2014.

3.2 RESEARCH APPROACH

The study was conducted using descriptive methods (descriptive method) in the form of case studies to describe and address the problems faced by the company and the business strategy undertaken in order to improve the competitiveness of enterprises. The type of data that is required in this study is primary and secondary data. Where the primary data obtained through in-depth interviews and questionnaires with corporate leaders to determine the internal and external factors that influence the PT Ciputra Indah in Pekanbaru. While secondary data collected through the study of literature, researchers drawn from a variety of written documents, internal company reports, news, research libraries, and so forth.

3.3 SAMPLING TECHNIQUES

Intake of informants and respondent performed using sampling techniques without opportunities (non-probability sampling) with determination intentionally (purposive sampling) through expertise judgment approach.

3.4 DATA PROCESSING AND ANALYSIS TECHNIQUES

Data processing techniques in this study is divided into three stages, namely the input stage, matching stage, and the stage of the decision. The input stage is done with descriptive analysis and analysis of industry competition. Phase matching is done with IFE matrix, EFE matrix, IE matrix, and SWOT matrix. Later stages of the decision made by using a matrix QSPM.

4 RESULT AND DISCUSSION

4.1 GENERAL DESCRIPTION

PT Ciputra Development Tbk ("Company") is one of the subsidiaries of Ciputra Group which was founded by Dr. Ir. Ciputra. This subsidiary was first established on 22 October 1981 under the name of PT Citra Habitat Indonesia. Over time, on December 28, 1990 changed its name to PT Ciputra Development until today. In 1994, the Company made an Initial Public Offering and listed on the Indonesia Stock Exchange (IDX). Until now, the Company has seven subsidiaries with more than 50 projects spread across 28 major cities in Indonesia, one of which was in Pekanbaru.

The first project in Pekanbaru was opened in February 2011 with the name of a collaborative CitraLand Pekanbaru (JV) between PT Ciputra Indah which is a subsidiary of PT Ciputra Development Tbk with a local company PT Wahana Nusantara. The motto that carried CitraLand Pekanbaru, namely Clean, Green, and Modern. Then in July 2012 PT Ciputra Indah cooperation with local company PT As is Peace opened a new project in Pekanbaru Pekanbaru CitraGarden name is the concept of The Art of Modern Living.

Vision, mission and philosophy of the Company are a reflection of the vision, mission, and philosophy held by the Group. This is done so that the Company has a direction and a purpose similar to what is owned by the Group. The vision is to "Develop a business group properties with superior spirit and full of innovation, thereby creating added value in providing a better life for the community and provide prosperity and welfare for all stakeholders". To achieve this vision, the Company has the mission of "Being at the forefront of the real estate business to be the most superior, professional and profitable, thus becoming the first choice for consumers, into the workplace of the most interesting and challenging for employees, becoming the most profitable investment for shareholders and be a real blessing for the people and the homeland "with the philosophy upheld by the Company are Integrity, Professionalism and Entrepreneurship.

4.2 INDUSTRY COMPETITION CONDITION BASED ON 5 FORCER'S PORTER

Industry competition analysis was conducted to determine the variables that affect the level of competition that exists in the industry today and understand the changes that will be faced by the company strategy in order to maximize profits. Of each variable are the parameters set forth in the form of a questionnaire that is then filled by each respondent to then

calculate weights, rating, and the scores of each of the variables that exist. The results of analytical assessment of industrial competition Companies can be seen in Table 1.

Table 1. Industrial Analysis of Assessment Results

No	Variable	Score	Information	Ranking
1	Threat of new entrants	1,77	Weak	5
2	Threat of substitute products	2,04	Moderate	3
3	Threat of inter-company	2,13	Moderate	2
4	Bargaining power of suppliers	2,17	Moderate	1
5	Bargaining power of buyers	2,03	Moderate	4

4.3   RESOURCE BASED VIEW

Resources based view to see that the resources are more valuable, rare, difficult to imitate, and hard to replace a significant source on improving competitive advantage. Resources owned by the Company, both of assets, capabilities, organizational processes, firm characteristics, information, and knowledge are in control of the company for the implementation of the strategy in order to achieve effectiveness and efficiency. Here is a descriptive presentation Company resource when viewed from the theory of competitive advantage through resources based view approach:

1. Valuable

   Company resources are considered valuable in improving the competitiveness of capital is very large and the absence of debt. These competencies are considered valuable because it can create value for the company by exploiting opportunities and neutralize threats in the external environment in order to build housing that is comfortable, safe, and also able to improve the social status of the consumer.

2. Rareness

   Currently the Company is the only developer who developed the concept of green housing. This is what makes the company has a competitive advantage, especially in Pekanbaru.

3. Inimitability

   Another competence that makes the company has a competitive advantage is the relationship between top management and employees, work culture, as well as the brand owned by Ciputra Group. This competence is very difficult to imitate by competitors because it has a unique historical, ambiguous, and the nature of social complexity. Internal and external relationships and work culture in which the Company made into a very comfortable working environment thus improving the performance of the Company.

4. Non-substitutability

   Resources owned by the Company are related to one another and cannot be exploited separately. This makes it difficult to imitate competitors of the Company's strategy as a whole should mimic the resources owned by the Company.

If seen from the above presentation, the Company included into the slow cycle of resource or resources durable. This is due to the company's brand has been trusted and known to the public, superior human resources, organizational a trusted resource, and physical resources are tested quality.

4.4   IDENTIFICATION OF EXTERNAL FACTORS

Identification of external factors was conducted in order to identify and evaluate trends and events that are beyond the control of the company. This can facilitate the identification of the company's management to determine strategies to exploit opportunities and avoid threats. The identification is done by using PESTEL analysis approach consisting of: (1) Aspects of Politics, Government, and Law, (2) Economic Aspects, (3) Social Aspects, Cultural, Demographic, and Environmental, and (4) Aspects of Technology.

In Table 2 are presented the results of assessment of external factors (EFE) as seen from the aspect PESTEL which gained a total assessment of external factors of 2.65. The total score indicates that the company's response to the use of the opportunities and avoid threats included in the medium category. When viewed in terms of opportunities, variables that

provide the greatest opportunity are of the political and legal aspects of the situation conducive in Pekanbaru in particular. While the variables that pose the greatest threat is the legislation that limits the widespread ownership of land.

Table 2. Results of The Assessment of External Factors

No	Factor	Importance Rate	Quality	Rating	Quality * Rating
	Opportunity				
1	The conveniences of licensing	5	0,09	2	0,17
2	Political and legal situation that is conducive	5	0,09	4	0,34
3	Economic growth of Riau	4	0,07	4	0,28
4	A lot of population	3	0,05	2	0,10
5	Number of communities	4	0,07	2	0,14
6	No housing in strategic locations that have large land	4	0,07	3	0,21
7	The development of technologies related to facilities and management	3	0,05	2	0,10
	Threat				
1	BI Circular Letter on interest rates for home investment	4	0,07	1	0,07
2	Recent legislation limiting the widespread ownership of land	5	0,09	4	0,34
3	Dependence on agricultural products income	5	0,09	2,5	0,22
4	Negative news quickly spread	4	0,07	4	0,28
5	Not yet usual live within the housing	3	0,05	2	0,10
6	Peat land conditions	4	0,07	3	0,21
7	Green property maintenance high costs	5	0,09	1	0,09
	The total value of EFE	58	1,00		2,65

4.5   IDENTIFICATION OF INTERNAL FACTORS

Identification of the Company's internal factors do research by identifying strengths and weaknesses of the company in order to face the competition of business. The identification is done by using tools such as questionnaires filled out by the company's internal leadership deemed competent to understand and with reference to the financial aspects, management, human resources, and technology. The total score is obtained by a score of 3.03 which indicates that the internal condition of the company in a strong state. The results can be seen in Table 3.

Table 3. The results of the analysis of internal factors

No	Factor	Importance Rate	Quality	Rating	Quality * Rating
	Strength				
1	Capital supported by group	5	0,11	3,5	0,39
2	Low employee turnover	5	0,11	3	0,33
3	Support from top management	5	0,11	4	0,44
4	HR performance is very loyal, kind, honest, expert.	5	0,11	4	0,44
5	Applying the pile foundation layer of geotextile	4	0,09	3	0,27
6	Implementing Management Information Systems	5	0,11	4	0,44
	Weakness				
1	Long financial application procedure	3	0,07	2	0,13
2	Long working lives cause costly salary	3	0,07	2	0,13
3	Shortage of managerial-level employees	2	0,04	2	0,09
4	The internet connection is not stable	4	0,09	2	0,18
5	Lack of technological development on peat	4	0,09	2	0,18
	The total value of IFE	45	1,00		**3,03**

4.6 MATRIKS IE

After assessment of internal factors (IFE) and external (EFE) of the company, it can be seen a grand strategy suitable to be applied to map the Company with a total value of IFE and EFE matrix into IE.
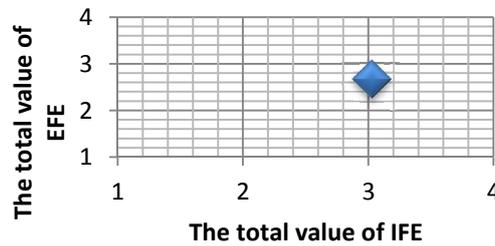

Fig. 1.   Results of IE matrix analysis

The total value of IFE obtained in the category of strong internal position, that is equal to 3.03 and the total value of EFE in the category of moderate external position with a value of 2.65. From Figure 1, it is known that the Company entered into the fourth quadrant cells, which grow and cultivated (grow and build). The strategies that can be used in this position are: (1) intensive strategies such as market penetration, market development, and product development, or (2) Integrative to do with forward integration or horizontal integration.

4.7 SWOT ANALYSIS

SWOT analysis tools used by researchers for the development of a strategy based on the strengths and weaknesses of the company and take advantage of opportunities and avoid threats. SWOT analysis is divided into four types of strategies, ie strategies SO, WO strategy, strategy ST, and WT strategy. Retrieved three strategies SO where this strategy utilizes the company's internal strengths to take advantage of external opportunities that exist, namely (1) differentiation, (2) Open a new project, and (3) Optimization of Research and Development division. The second strategy is WO strategies aimed at improving internal weaknesses by taking advantage of external opportunities, namely (1) Recruiting new employees in managerial level, (2) Improve the quality of human resources, and (3) Optimizing the use of technology. The third strategy is the strategy of ST in which this strategy using the power of a company to avoid or reduce the impact of external threats, namely (1) edu-promotion of environmental issues and the role of green property, (2) Provide an alternative home for facilitating consumer payments that are not considered bankable to take out mortgages, (3) Selecting a location conducive project development, and (4) Conduct a contract with a contractor or supplier of material required in order to stay awake quantity, quality, and continuity. The fourth strategy is a strategy WT where this strategy is a defensive tactic aimed to reduce internal weaknesses and avoid external threats, namely (1) Improve the quality of the relationship with customers and prospective customers in, and (2) the capacity, planning and finance in order to finish on time .

4.8 ALTERNATIVE STRATEGIES QSPM ANALYSIS RESULTS (QUANTITATIVE STRATEGIC PLANNING MATRIX)

SWOT analysis generates multiple options strategies that can be adopted by the Company in order to improve competitiveness in the business industry green property. Then the researchers conducted an analysis QSPM to choose which strategy is considered to be the most relevant and optimized to be applied in the Company. The strategies included in the questionnaire QSPM is a strategy that has been chosen intuitively by researchers from the previous stage. Then the researchers asked respondents to assess the Score Atrrackiveness each strategy. Once assessed by the respondents, the researchers then calculated the Total Atrrackiveness Score (TAS) by adding all TAS on each proposed strategy. Strategies that have a total value of highest TAS is the best strategy to be implemented.

The choice of strategy QSPM included in the analysis are:

1.   Strategy A: Differentiation. Both in terms of concepts, quality, service, technology, materials, design, and facilities.
2.   Strategy B: Open a new project in order to increase market share.
3.   Strategy C: Creative promotion. Doing edu-promotion that not only did the introduction of the product but also increase knowledge about green property community and raise public awareness of the importance of harmony with nature.
4.   Strategy D: Improving the quality of relationships with prospective customers and consumers. Through personal approach, is expected to foster a sense of comfort, trust, and have.

QSPM assessment results show that the strategy that gets the highest score with a value of 6.65 is a strategy TAS B, where the Company is advisable to open a new project. Strategy B aims to increase market share in order to improve the competitiveness of the Company. This strategy is also in accordance with the suggestions generated from the IE matrix, which is grown and cultivated with market penetration, market development, or product development. The second strategy A strategy is suggested by TAS value of 6.39 where the Company made a good differentiation of the concept, quality, service, technology, materials, design, and facilities offered. Differentiation used as value-added and a differentiator with a similar product that is expected to improve the competitiveness of the Company. The third strategy is the strategy suggested C with TAS value of 5.53 is a creative promotion. The increasing demand competitor company to increase promotion. Promotion is an attempt by the company to communicate the existence and value of the product to prospective customers (Mardian 2011). Companies need to do marketing to promote the education, which increased public awareness on environmental issues and the role of green property to increase the function of the environment as well as a wide range of consumer benefits green property.

Application of alternative strategies produced QSPM not have an adverse effect or change the Company's current policy is that alternative strategies can be adopted easily by the Company. The results of this study also support and prove to the company that opened a new project is the right choice in order to improve the competitiveness of the Company in the business industry green property in Pekanbaru. Researchers suggest to the Company to immediately take further action in order to finalize the concept and realization of the strategy within 1 year. This is done in anticipation of increased competition in the industry peers green property when opening a similar project in Pekanbaru. Expected in 2015, the Company has opened a new project in order to meet the needs of the community will Pekanbaru business centers and trade is the concept of green.

5   CONCLUSION

Based on the results of research conducted, it is known that the conditions of competition in an industrial environment conducive Pekanbaru green property where there is no obstacle factors to obtain high scores. The factors that are considered to be a threat is the bargaining power of suppliers because of the number of suppliers of goods in accordance with the specifications are still a few who were in Soweto and was still a little subtitusinya goods. The results of the analysis of external factors indicate that the political aspects, government, and law is an aspect that gives the best opportunity for the Company to expand its business. This is due to the political and legal situation in Pekanbaru very conducive to developing a green property business in particular. In addition to giving the highest odds, political aspects, government, and law also became the highest threat because of their extensive local regulations limit the ownership of land. The internal factor analysis indicate that aspects of human resources and technology are the main strengths of the Company. In addition to being a major force, technological aspect is also an aspect that became a major drawback for the Company due to the limited power network and internet connection instability in Pekanbaru that disrupt the management information system applied Company. Obtained from various analysis QSPM most optimal strategy to be applied by the Company, the strategy opens a new project. This strategy is expected to increase the market share of the Company to increase the Company's competitiveness in industrial green property in Pekanbaru.

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A Low Noise Variable Gain Amplifier

Pratik Ravindra Junwar[1] and Usha Verma[2]

[1]Department of Electronics (VLSI and Embedded),
MIT Academy of Engineering,
Pune, Maharashtra, India

[2]Department of Electronics,
MIT Academy of Engineering,
Pune, Maharashtra, India

ABSTRACT: A Low noise variable gain amplifier (VGA) was designed using TSMC 0.13 um CMOS technology. This design is proposed to work at frequency range of 40 to 950 MHz. In this proposed work a numbers of attenuators are placed after two stages of Low noise amplifiers [LNA]. Each attenuator is used to obtain variable gain of amplifier. Control Voltage is applied to each attenuator to obtain variation in gain. The first stage of amplifier is designed for high gain and low noise figure. The second stage is designed for high gain and high linearity. The proposed VGA have achieved the gain of -0.81 db to 29.08 db at 40 MHz and -3.14 db to 26.644 db at 950 MHz. The noise figure of proposed designed is 1.747 db at 40 MHz and 1.411db at 950 MHz when all attenuators are off and 4.032 db at 40 MHz and 4.995 db at 950 MHz when all attenuators are on.

KEYWORDS: Low Noise Amplifier (LNA), variable gain amplifier (VGA), Attenuator, Linearity, Noise figure.

1 INTRODUCTION

Variable gain amplifiers (VGAs) are an important building block for to maximize the dynamic range of system like disk drives and wireless communication link [1]-[3]. There is a need to increase the bandwidth over a several tens of megahertz and at the same time it is required to decrease the power consumption for many multimodal applications [4]. The VGA has many advantages like low power consumption, continuous gain tuning and small chip size. The output linearity of the VGA can be improved by applying load degeneration technique [1]. There are two methods to build VGA, one analog controlled VGA [2] and other digitally controlled VGA [5]. In these design we are using analog controlled VGA. Variable gain amplifier (VGA) is implemented for high speed communication receiver system. In this a dc offset cancellation and dual feedback network for bandwidth extension method is used [6]. The variable gain amplifier (VGA) can be achieved by changing the gain transfer function of an amplifier according to the gain control signal. It also be obtained by continuous gain tuning in which a linear db gain is controlled and implemented [7] [8]. In order to control signal levels in the receiver, adjustable attenuators are useful. Particularly, a high linearity characteristic is a key requirement in most modern wireless communication [9]. Inspite of all these, a different method using attenuator is implemented in the current paper. In this method, numbers of attenuator are placed after two stages of low noise amplifiers (LNA). Each attenuator are used to obtain variation in gain. So, by controlling the bits of attenuators variable gain of ampliflier can be obtained.
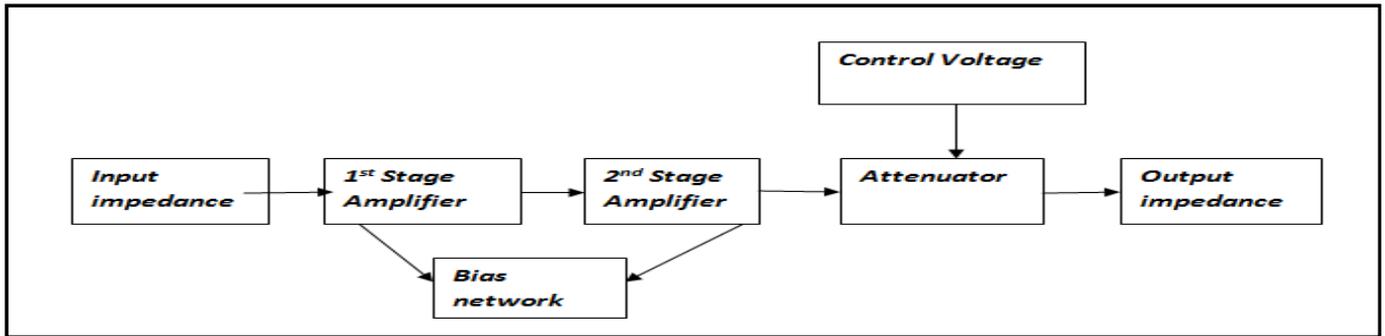
Fig. 1.   Block Diagram of proposed design

The block diagram of low noise variable gain amplifier is shown in fig. 1. It consists of two stages of amplifier followed by a numbers of attenuator for variation in gain. The first stage of amplifier is implemented for a high gain and low noise figure. Second stage is designed for high gain and high linearity. Each attenuator is used to obtain the variable gain of amplifier.

In this paper we propose a design for a low noise variable gain amplifier. In these design a number of attenuator is placed after two stages of amplifier to obtain the variable gain of amplifier. This paper is organized as follows:

First we have described the design of attenuator in section 2. Then we have described the design of proposed low noise variable gain amplifier (VGA) in section 3. In section 4 we present the measurement results. Finally section 5 draws the conclusion.

2   PROPOSED DESIGN OF ATTENUATOR

Fig 2 shows the proposed design of the attenuator. In these proposed design we are using attenuator for variation in gain. In these we are using T pad attenuator topology. The variation in gain is obtained by controlling the bits of attenuator. Control voltage is applied to the attenuator. Control voltage converts the fixed voltage in to variable voltage. This is fed to attenuator to obtained variable gain amplifier. In this proposed design we are using MOS as a switch. By controlling on or off state of switch, variation in gain can be obtained. When VC1, VC3 and VC5 are on and VC2, VC4 and VC6 are off, then all the attenuators are off. When VC1, VC3 and VC5 are off and VC2, VC4 and VC6 are on, then all the attenuators are on. So by controlling the states of switch a variable gain of amplifier is obtained.
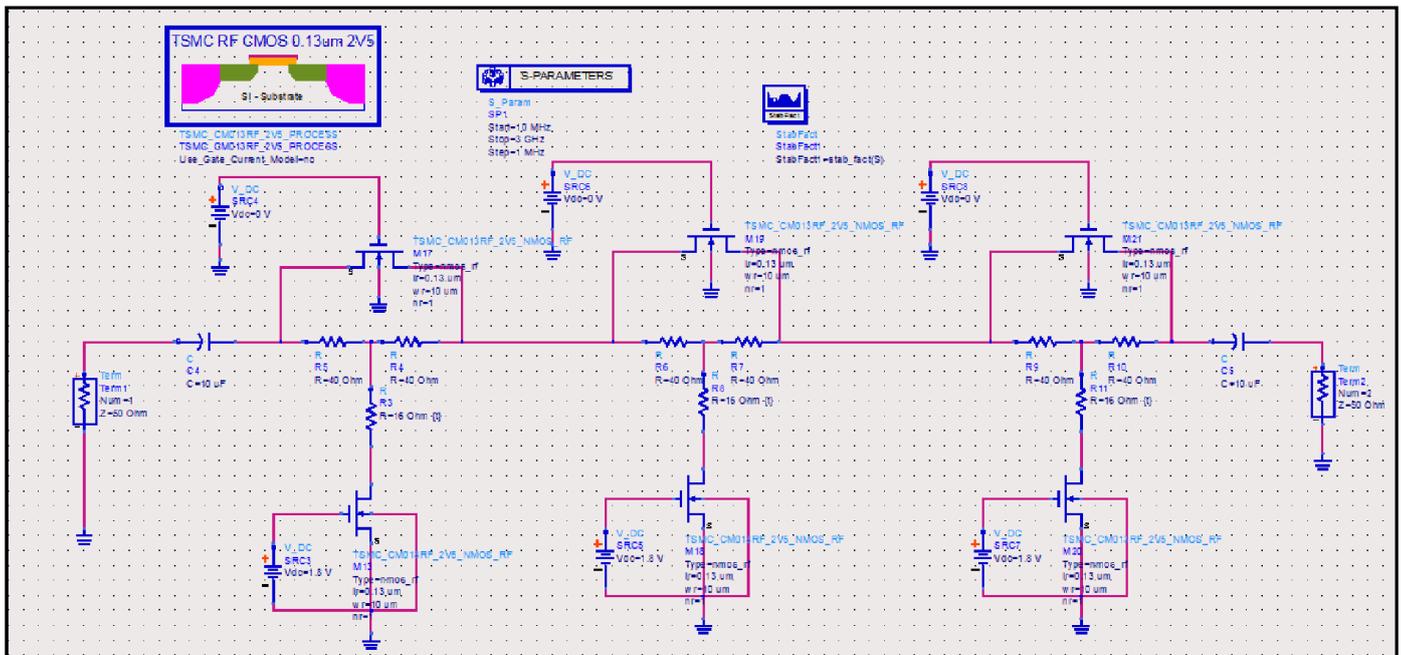
Fig. 2.   Proposed design of three stages of attenuators

3   DESIGN SCHEMATICS

Fig. 3. Shows the proposed design of low noise variable gain amplifier which is implemented in Agilent's ADS 2009 software. The first two stages are of amplifiers which are followed by the four stages of attenuator. Fig. 3. Shows the two stages of amplifier followed by an attenuator but in actual design a four stages of attenuators are used to obtain about 30db of attenuation. The first stage of amplifier is implemented for a high gain and low noise figure. Second stage is designed for high gain and high linearity. The stages of attenuator provides the variation in gain hence a variable gain amplifier is obtained. As we require high gain and low noise figure characteristics we are using a LNA, as the two stages of amplifiers. Both these parameters are trade off, so there were several topologies for broad band characteristics such as compensated matching theory and feedback method [9]. In these proposed design a self biased negative feedback topology is used. In these both the transistor M1, M3 forms a CMOS inverter with a negative feedback resistor. Using this method M3 transistor will adapt the same voltage level of M1 transistor and is called as self biasing and hence the same amount of current flows in M1 as well as in M3. The same LNA topology is used for the second stage. So we obtained a high gain, low noise figure and high linearity. Each Attenuator is placed after the amplifier to obtain the variation in gain. We are using the T pad attenuator topology. In this design of attenuator we are using MOS as a switch. By controlling on or off state of switch, variation in gain can be obtained. When VC1, VC3 and VC5 are on and VC2, VC4 and VC6 are off, then all the attenuators are off. When VC1, VC3 and VC5 are off and VC2, VC4 and VC6 are on, then all the attenuators are on.   So by controlling the states of switch a variable gain amplifier is obtained. The four stages of attenuator are used to obtain 30 db attenuation.
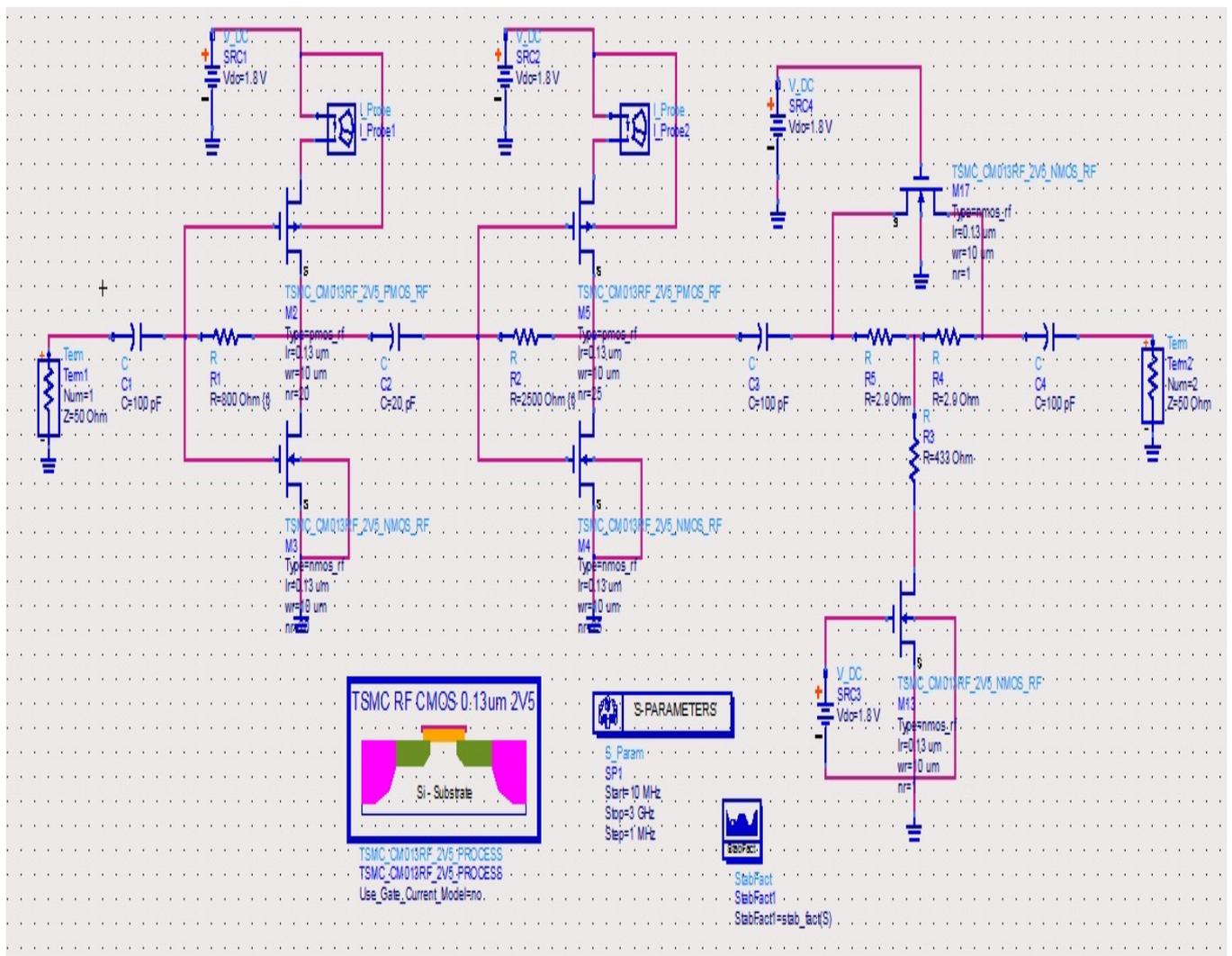
Fig. 3.   Proposed design of variable gain amplifier

4   MEASUREMENT RESULTS

In this section the results of the proposed designed are shown. This section discusses Gain, Noise Figure and stability. The proposed design of VGA is obtained by using TSMC 0.13 um CMOS technology. This design is proposed to work at frequency range of 40 to 950 MHz

Fig. 4. Shows NF results when all attenuator are off. NF ranges from 1.747dB to 1.411dB for 40MHz to 950 MHz. Fig. 5. Shows NF results of VGA when all attenuator are on. NF ranges for 4.032 db to 4.995 db over the operating frequency range. So the noise figures of proposed designed of VGA ranges for 1.747 db to 4.032 db and for 1.411 db to 4.995 db over the operating frequency range.
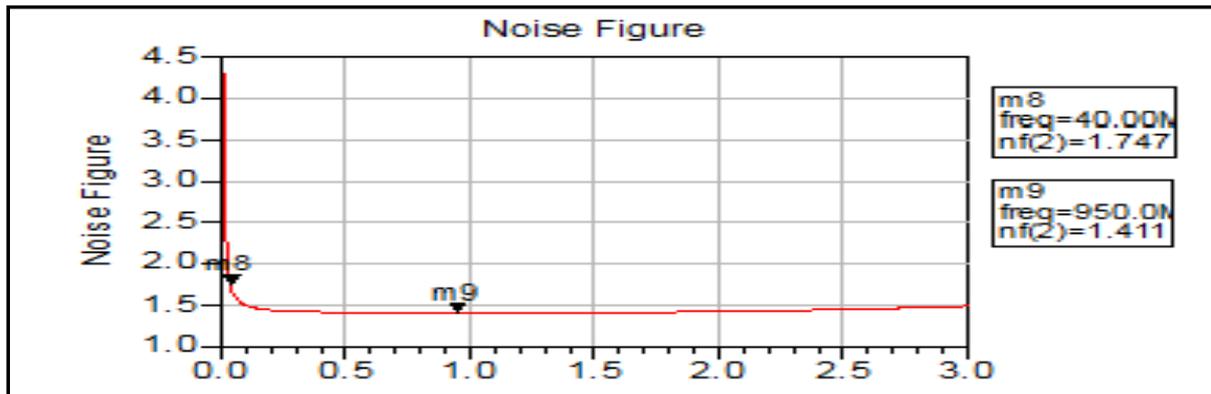
Fig. 4. Noise Figure over the operating frequency range when all attenuators are off
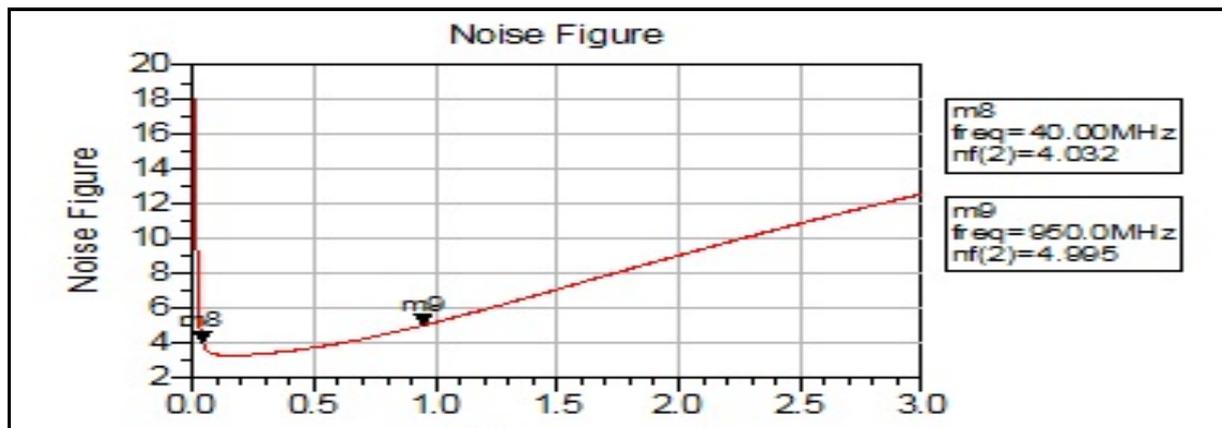
Fig. 5. Noise Figure over the operating frequency range when all attenuators are on

Fig. 6. and Fig. 7. Shows gain achieved by the proposed design. The proposed design achieved the gain of -0.81 db to 29.08 db at 40 MHz and -3.14 db to 26.644 db at 950 MHz, for variation in gain four stages of attenuator is used so we obtained an attenuation of about 30db. This attenuation is obtained by controlling the switch of attenuator.
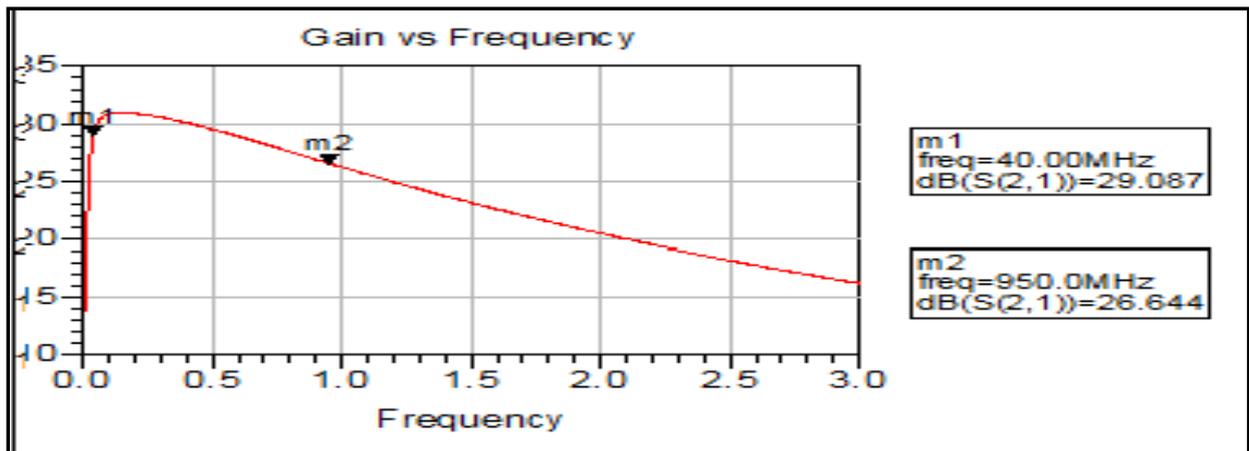
Fig. 6. Gain v/s frequency when all attenuators are off
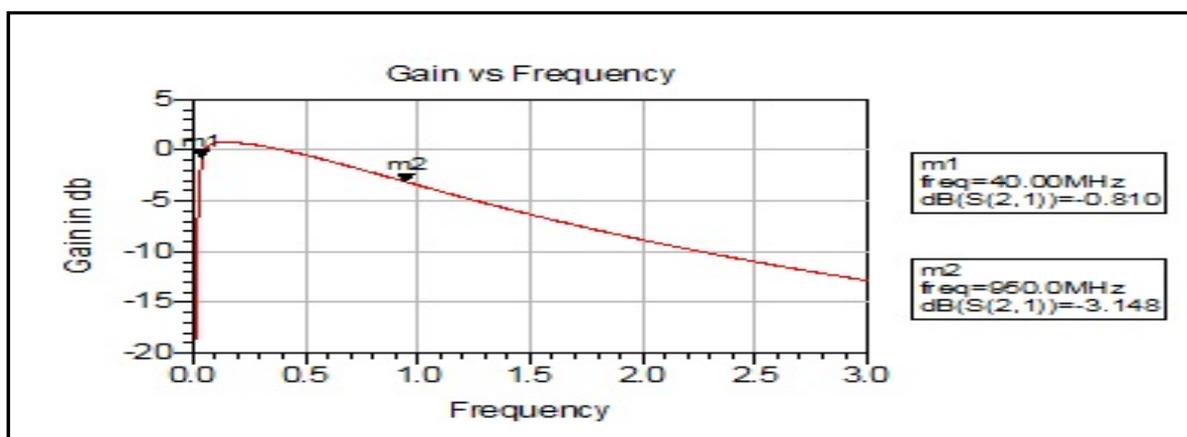
Fig. 7. Gain v/s frequency when attenuators are on

Table 1. Control strategies for VGA

			Control Voltages					Gain		Attenuator status			
VC1	VC2	VC3	VC4	VC5	VC6	VC7	VC8	40Mhz	950Mhz	first	Second	third	fourth
1	0	1	0	1	0	1	0	29.08db	26.644db	off	off	off	off
0	1	1	0	1	0	1	0	22.205db	19.839db	on	off	off	off
1	0	0	1	1	0	1	0	21.496db	19.109db	off	on	off	off
1	0	1	0	0	1	1	0	21.321db	18.911db	off	off	on	off
1	0	1	0	1	0	0	1	21.652db	19.216db	off	off	off	on
0	1	0	1	1	0	1	0	14.36db	12.016db	on	on	off	off
0	1	0	1	0	1	1	0	6.627db	4.288db	on	on	on	off
0	1	0	1	0	1	0	1	(-)0.810db	(-)3.14db	on	on	on	0n
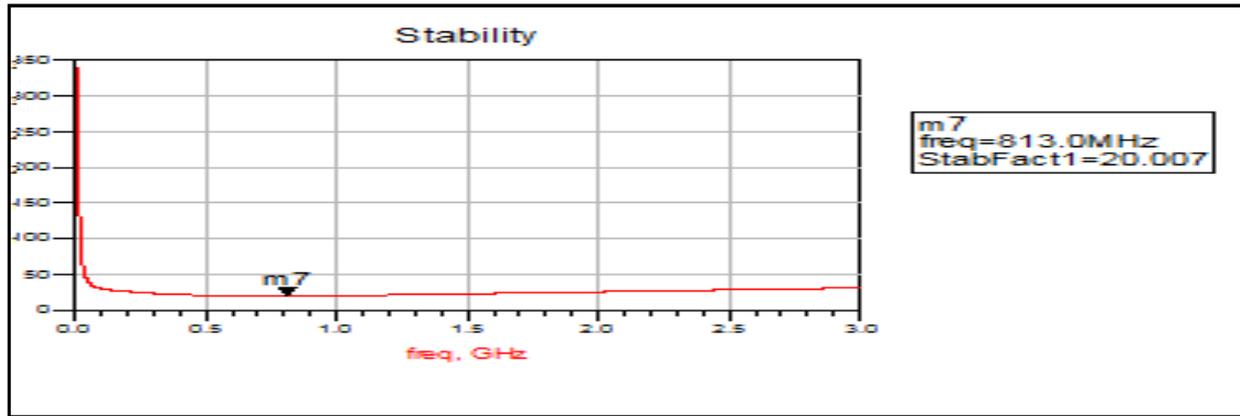
Fig. 8.   Stability of the system

Fig. 8. Shows stability of the system over the operating frequency range. For a VGA to be unconditionally stable, the stability factor has to be greater than 1, and β has to be greater than 0. The simulations show that the VGA is stable for its complete operating frequency range.

Table .2. Performance Comparison Of low noise VGA

Ref.	Technology	Gain Range	Noise Figure	Year
[1]	0.18 um CMOS	-20 to41 db	14db	2011
[2]	0.6 um CMOS	0 to 30db	NA	1995
[9]	0.18 um CMOS	23 to 24 db	6.3 to 7.2 db	2010
[6]	0.9 um CMOS	-10 to 50 db	17 to 30 db	2012
This Work	0.13 um CMOS	-0.81 db to 29.08 db at 40 MHz -3.14 db to 26.644db at 950 MHz	1.747 db to 4.032 db at 40 MHz 1.411 db to 4.995 db at 950 MHz	2015

5   CONCLUSION

In this paper, a low noise variable gain amplifier (VGA) has been designed. In this proposed design a number of attenuators are used, after two stages of amplifier. The proposed VGA was designed using TSMC 0.13 um CMOS technology. This design is proposed to work at frequency range of 40 to 950 MHz. Each attenuator is used for variation in gain. Experimental results shows that, this proposed VGA can cover a wide gain range from -0.81 db to 29.08 db at 40 MHz and -3.14 db to 26.644 db at 950 MHz and the noise figure of proposed designed of VGA ranges from 1.747 db to 4.032 db and from 1.411 db to 4.995 db over the operating frequency range. The results achieved are simulated results obtained on Agilent's ADS 2009.

ACKNOWLEDGMENT

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Epidemiology of Toxoplasmosis among Married Women at Birth Age in Sana'a City (Yemen)

Alkhali Arwa[1-2], Asmae Hmamouch[3], Abdelaziz Amayour[1], Ikram Marc[1], Khadija El Kharrim[1], and Driss Belghyti[1]

[1]Environmental and Renewable Energy Laboratory,
Faculty of Sciences, Ibn Tofail University,
Kenitra, Morocco

[2]Medical Laboratory,
Althawra Hospital, Sana'a, Yemen

[3]Laboratory of Microbial Biotechnology,
Sidi Mohammed Ben Abdellah University,
Fes, Morocco

ABSTRACT: *Background:* The endemic of toxoplasmosis infection is considered high in Yemen, but there has been inadequate information on the prevalence rate and risk determinants among female at age bearing time in Yemen. This study shed some light on the epidemiology of Toxoplasmosis among women in Yemen.

The aim of the present study to determine the Seroprevalence of T. gondii antibodies among pregnant and non pregnant women in Sana'a city, its associated risks exposures as age, residence, education, history of abortion, contact with animals and undercooked meat or food.

Method: This study was a cross-sectional study, the size of sample was 200, after a questionnaire applied to the pregnant and none pregnant women, anti-Toxoplasma IgG, IgM antibodies were studied by (ECL).

Results: 86 samples 43% were seropositive for anti-Toxoplasma gondii IgG and six samples 3% were seropositive for anti-Toxoplasma gondii IgM.

In The positive samples (86) for IgG the mean age of the women was ≥ 15 years and, the rate was 5% for age group 15-19 years, 16% for 20-24 years, 22%for 25-29 years, 20% for 30-34years, (20%) for35-39% and 17% for ≥ 40 years and, the prevalence rate of IgG 48.3% for females who, had abortion and 38.9% for females who hadn't abortion. For the residency 66% of infection was in urban, 34% was in rural.

Conclusion: Increased Seroprevalence of Toxoplasmosis.

KEYWORDS: Endemic, Seroprevalence, Risk factors, T. gondii antibodies, ECL.

1 INTRODUCTION

Toxoplasmosis, being one of the torch's infection in pregnant women. It is Infection with the intracellular parasite Toxoplasma gondii causes serious public health problems, and it infect at least 500 million people worldwide [1].

The most infected individuals are asymptomatic; when these individuals in period of their lives suffer from immune deficiency (such as: AIDS, cancer and chemotherapy, etc.), they will have a recurrence of the disease. Cat is primary host of the parasite and developmental cycle of the parasite is processed in the cat's body [2].

It has been reported that toxoplasmosis is present in every country; the seropositivity rates range from less than 10% to over 90% [3], and the Seroprevalence of Toxoplasma infection widely differs, between 30% and 60%, in both developed and developing countries [4].

Transmission of T. gondii is usually by ingestion of cysts infected and undercooked or raw meat or by accidental ingestion of oocysts that may contaminate soil, water, and food. Meat is one of the most important sources of the infection in individuals [5].

Toxoplasmosis is also one of the infections that can be transmitted through placenta during pregnancy [6].

Women infected with T. gondii before conception rarely transmit the parasite to their fetus, but those who become acutely infected or have reactivation of T. gondii during pregnancy (i.e, because of immunosuppression) can transmit the parasites transplacentally.

The risk of congenital disease is lowest (10-25%) when maternal infection occurs during the first trimester and highest (60-90%) when maternal infection occurs during the third trimester [7]. However, congenital disease is more severe when infection is acquired in the first trimester [8].

The overall risk of congenital infection from acute T. gondii infection during pregnancy ranges from approximately 20-50% [9].

Toxoplasmosis is diagnosed in laboratory by immunological testing that give the titer of circulating antibodies, and in fetus toxoplasmosis based on direct identification of the parasite by inoculation of amniotic liquid and/or fetal blood in mice, as well as cell culture [10].

2   MATERIALS AND METHODS

A total of 200 pregnant and non pregnant women was examined by collect a blood sample for the period from April to September 2009 in Al-Thawra hospital and other medical centers to determine Toxoplasma gondii antibodies. Two sample for each woman was collected in tubes (5 ml), and stored.

The sera was separated by centrifugation at 4000 rpm for ten minutes in room temperature, stored at -20 0C until use. Full history was taken from each studied woman, and the findings were recorded in a predesigned questionnaire.

A questionnaire sheet was designed to evaluate some of the main risk factors, which may influence the prevalence of Toxoplasma infection among the expecting women volunteers. The risk factors considered in this study include age, residence (urban or rural), educational level (illiterate, primary, secondary, university).

The samples analyzed in medical laboratory in Althawra Hospital by ECL for serodiagnosis (IgM, IgG) of toxoplasmosis, statistical analyzed was perform by the software R, X2 of Pearson were used for comparison between variables. For all test the significance level was 0.05 also used Excel program.

3   RESULTS

The age distribution of females tested for Toxoplasmosis antibodies in Sana'a, Yemen (Table 1). Most of the females were in age grouped from 20-34 years. Only 8% of females were   under age of 20 years (15-19yrs). Also 12.5% of our tested females were over 40 yrs of age. The distribution of age groups was significant X2=22.42, PV=0.0004356.

Table 1. The age distribution of 200 females tested for toxoplasmosis antibodies in Sana'a city, Yemen.

Age groups(years)	Number	%
15-19	16	8
20 – 24	42	21
25-29	50	25
30-34	37	18.5
35 – 39	30	15
≥ 40	25	12.5
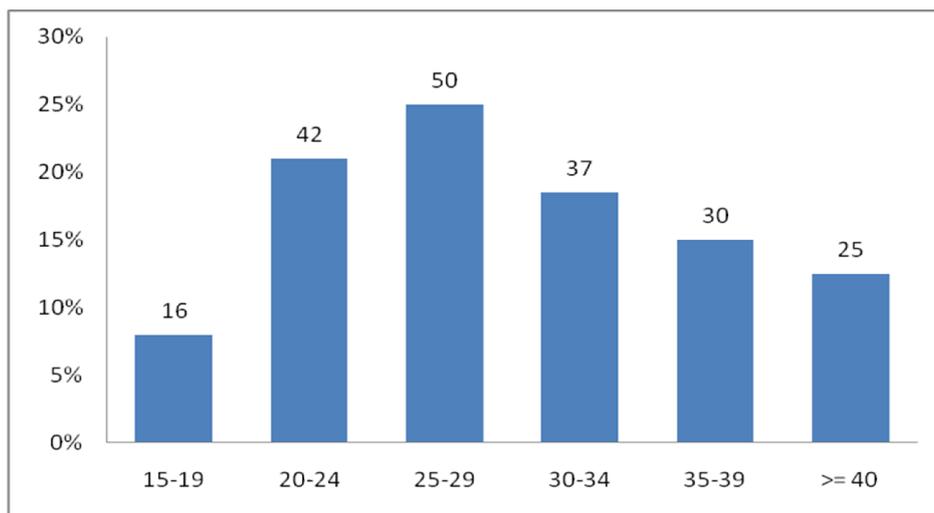
Fig. 1.   The age distribution of 200 females tested for toxoplasmosis antibodies in Sana'a city, Yemen

The educational and residency status of females for Toxoplasmosis antibodies (Table2).. Concerning the educational statues (38.5%)were illiteracy women,(20%)were had primary education , then(43%)were had secondary education and finally(40%) were had secondary education . The result was significant where X2=19.56, PV=0.000204

Concerning the residency statues (66%) was in urban, while (34%) was in rural and the variation between two rates was highly significant where X2=20.48, PV=6.026.10-6

Table 2.The educational and residency status of 200 females tested for toxoplasmosis antibodies in Sana'a city, Yemen.

Characters		Number	%
Education	**Illiterate**	77	38.5
	Primary	40	20
	Secondary	43	21.5
	University	40	20
Residency	**Rural**	68	34
	Urban	132	66
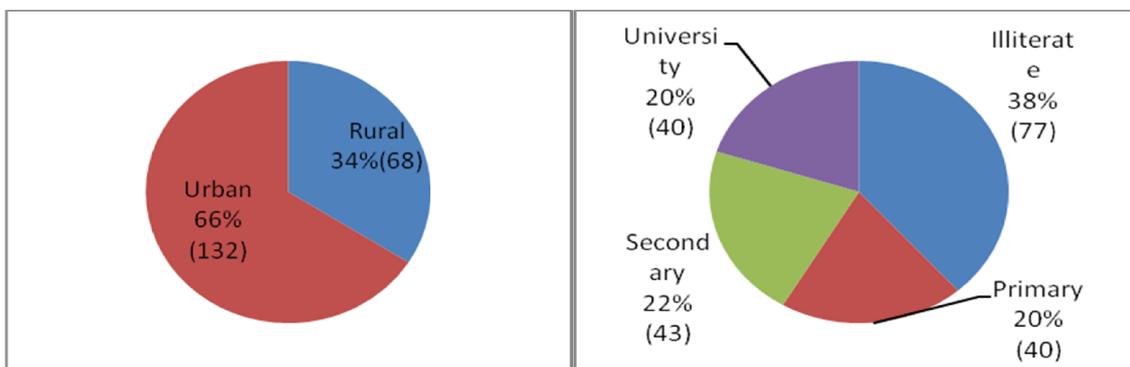
Fig. 2.   The educational and residency status of 200 females tested for toxoplasmosis antibodies in Sana'a city, Yemen.

The seropositive for anti-Toxoplasma gondii IgG and IgM(Table3). For IgG was 86(43%), the result was significant X2=3.92, PV=0.04771 and for anti T.gondii IgM was 6 (3%), X2=176.72, PV<2.2.10-6 so the result was highly significant.

Table 3. The Seroprevalence rate of IgG and IgM against toxoplasmosis by ELecsys test among 200 female tested for toxoplasmosis antibodies in Sana'a city, Yemen

Antibody type	Number of females tested	Positive		Negative	
		No.	%	No.	%
IgG	200	86	43	114	57
IgM	200	6	3	194	97
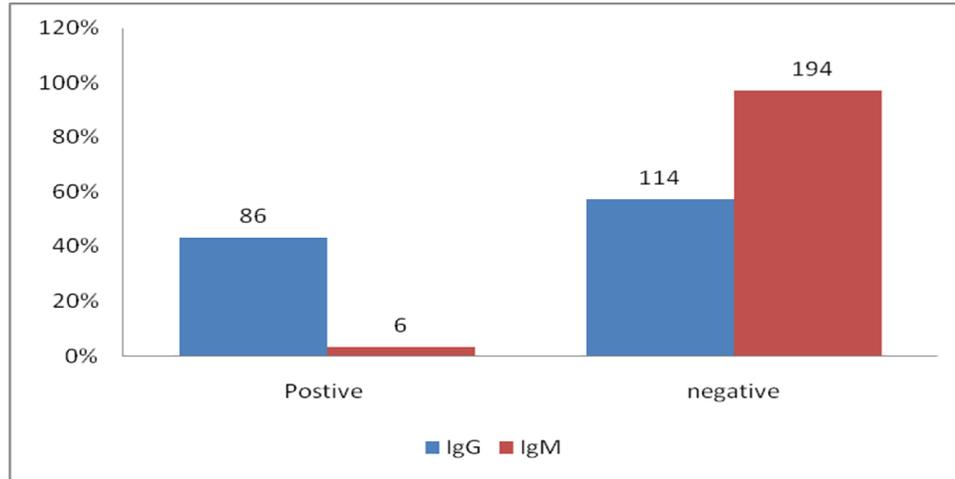
Fig. 3. The Seroprevalence rate of IgG and IgM against toxoplasmosis by ELecsys test among 200 female tested for toxoplasmosis antibodies in Sana'a city, Yemen

The distribution of positive serum samples among the different age groups for IgG shows (Table 4). The women of the age group≥ 40 had the highest percentage 60%, the result of this relation was not significant X2=10, PV=0.07524.

Table 4. The age distribution of 200 females tested for anti T.gondii IgG in Sana'a city, Yemen.

Age group(years)	Number	IgG	
		No. Positive (%)	No. Negative (%)
15-19	16	4 (25)	12 (75)
20-24	42	14 (33.3)	28 (66.7)
25-29	50	19 (38)	31 (62)
30-34	37	17 (45.9)	20 (54.1)
35-39	30	17 (56.7)	13 (43.3)
≥ 40	25	15 (60)	10 (40)
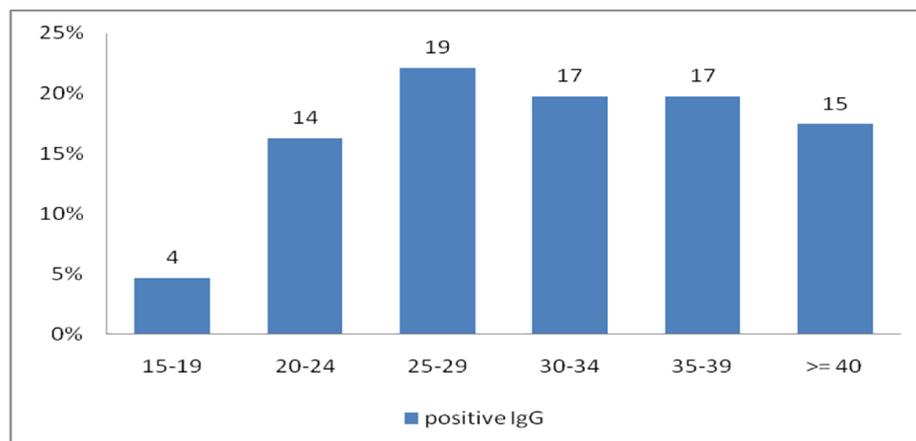
Fig. 4. The age distribution of 200 females tested for anti T.gondii IgG in Sana'a city, Yemen

Depending on previous tables, were excluded negative samples, continue to study and analysis positive samples, and focused on three risk determinants: age group, education, residency, history of abortion as illustrated in the following tables.

The educational and residency status of females for Toxoplasmosis antibodies (Table5).

Concerning the educational statues highest rate of seropositive IgG were occurred in illiteracy women (44.19%), X2=18, PV=0.0004398 so the relation between levels of education was significant.

Concerning the residency statues, the highest percent was in urban74.42% While 25.58% was in rural and this result also was significant X2=20.5116, PV=5.927.10-6

Table 5. The seroprevalance of IgG antibodies agnist toxoplasmosis and relative risk education and residency.

Characters		Positive IgG	
		No.	(%)
Education	Illiterate	38	(44.19)
	Primary	14	(16.28)
	Secondary	20	(23.25)
	University	14	(16.28)
Residency	Rural	22	(25.58)
	Urban	64	(74.42)
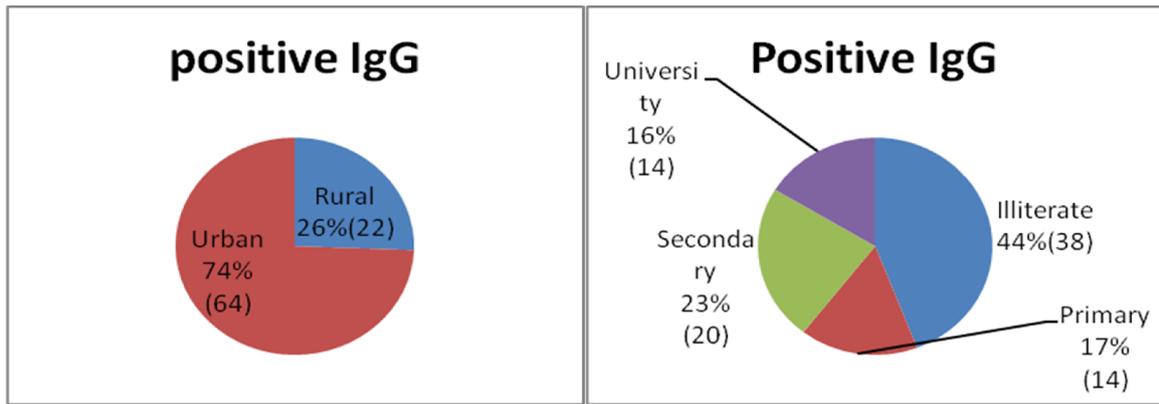
Fig. 5. The Seroprevalence of IgG antibodies agnist toxoplasmosis and relative risk education and residency.

The relation between IgG antibodies positive for toxoplasmosis and history of abortion shows (Table 6). The prevalence rate of IgG with females who had abortion 48.84%, while the prevalence rate of IgG with females who hadn't abortion 51.16%.This result was not significant X2=0.0465, PV=0.8292.

Table 6. The relation between IgG antibodies positive for toxoplasmosis and history of abortion among positive females in Sana'a city, Yemen.

History of Abortion	Positive IgG	
	No.	(%)
Abortion	42	(48.84)
No Abortion	44	(51.16)
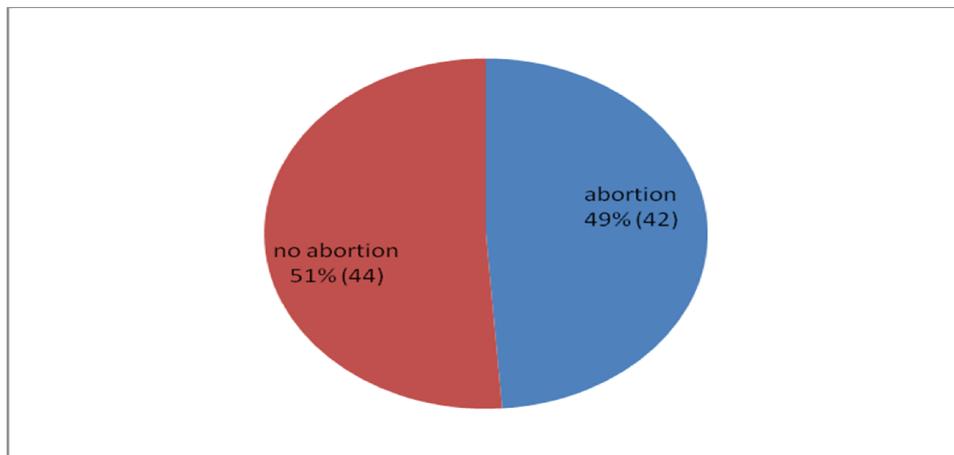
Fig. 6.The relation between IgG antibodies positive for toxoplasmosis and history of abortion among positive females in Sana'a city, Yemen

The potential risk factors of contracting toxoplasmosis among females in Sana'a city (Table 5). Shows no risk for contracting toxoplasmosis and animal contact in which X2=0.186, PV=0.28.

For contracting toxoplasmosis and Consuming, uncooked meat there was significant result in which X2=26.7907, PV=2.267.10-6 and there was significant result for contracting toxoplasmosis with Consuming raw vegetable X2=16.7907, PV=4.174.10-6.

Table7. The potential risk factors of contracting toxoplasmosis among females, Sana'a city Yemen

Characters	Positive IgG n=86	
	No	%
Animal contact	45	46.9
Consuming uncooked	19	38.8
Consuming raw vegetable	24	50
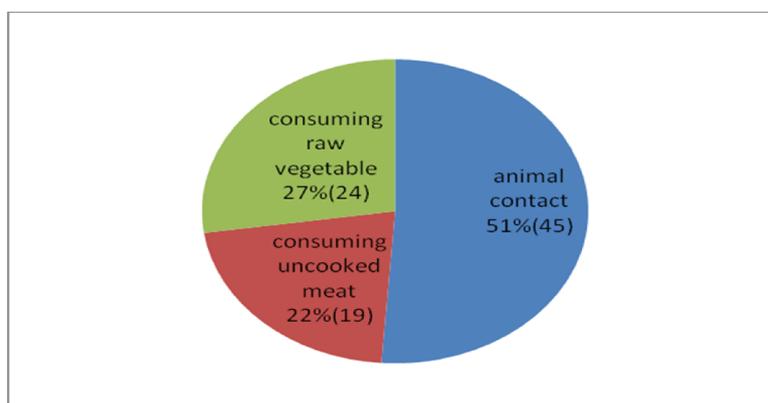
Fig.7. the potential risk factors of contracting toxoplasmosis among females, Sana'a city Yemen

4   DISCUSSION AND CONCLUSION

The high incidence of Toxoplasmosis infection in Yemen and the not clear epidemiological picture lead to opened the debate concerning the appropriateness of determine toxoplasmosis problem in female at age bearing time which usually lead to defect in fetus. For this reason prevent of congenital defects of toxoplasmosis originally depend on understanding the epidemiology of toxoplasmosis among this group of females appeared as a good option for prevention toxoplasmosis related complications in fetus or on mother [10]. This study was conducted   aiming to understanding the prevalence and epidemiology of toxoplasmosis among female at age bearing time in Yemen to find preventive measures can be suitable for Yemen to prevent congenital defect due to toxoplasmosis.

A study of 200 female at age bearing time, resident in Sana'a city Yemen, revealed that the IgG Seroprevalence according to Elecsys was 43%, and that of IgM was 3%. The recent active of toxoplasmosis infection, estimated on the basis of IgM was 3%. These results confirm a high rate of toxoplasmosis in the prevalence of IgG that indicate protected antibodies level, but also indicate a only 3% of recent active infection and possibility for 57% of pregnant women to infect during pregnancy, thus suggesting that screening for anti-Toxoplasma antibodies during pregnancy should be maintained.

In addition, the 43% of Toxoplasma IgG antibodies that detected among females at age bearing time a may have been due to either past infection (apparently sub-clinical), current active subclinical disease or exposure to the parasite without active disease.

The Seroprevalence of pregnant toxoplasmosis were reported in many countries as reaching 80% to 90% in northern Europe (United Kingdom, Norway, Sweden), 20% in Brazil, 50% in France, [11], 42% in Italy [12], in Iran (57%) [13], 58.2% in Kuwait [14]. This Seroprevalence of IgG antibody in our study (43%) which was in near to some other value previously reported in Saudi Arabia (43.4%) [15], 44% in Somalia [16], and 47.1% in Jordan [17].

The high prevalence in these countries is probably due to a high consumption of raw and lightly cooked meat [18]. On the other hand, our high rate is related mostly to the high rate of environment contamination as it seen in the tropic due to low level or absent hygiene standards for personal and for environment. In the population tested, 3% of the females were positive for Toxoplasma IgM antibody. The Seroprevalence of IgM antibody in these females is due to current active disease. This infection with toxoplasmosis in most immunocompetent females, the infection enters a latent phase, during which only bradyzoites are present, forming cysts in nervous and muscle tissue [19], it may be exhibits a wide range of clinical manifestation from asymptomatic infection to clinical symptomatic disease including fever, lymphadenopathy, etc[20]. This infection might be increased risk for the fetus if the female pregnant to abortion or fetus infection that lead to congenital deformity of newborn [21].

The infections transmission among study group might be through direct contact with animal sources [22] or through ingestion contaminated food with infective stage (Sporozoites) [23]. This study showed there was association between the risk of contracting toxoplasmosis infection (IgG positive) and residency in urban areas .This result similar to that reported by Baril [24] and it is different from result that reported in Greece where high risk of contracting toxoplasmosis was occurred with residency in rural areas than urban areas [22].

5 CONCLUSION

This study revealed a high Seroprevalence of T. gondii antibodies among Yemeni married women in Sana'a city so one of every two women at risk, toxoplasmosis rate was high among women illiterate more than women educated so health education for female's community is very important to prevent infection in future. At the same time the infection, showed increasing in urban area, Controlling and monitoring should be implement to reduce the risk of toxoplasmosis. Further epidemiological study to determine the prevalence of T. gondii in all cities in Yemen is necessary.

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Les plantes médicinales utilisées dans le traitement de l'asthme à l'ile d'Idjwi (Sud-Kivu, R.D. Congo)

Patrick Habakaramo Macumu[1-2], Ntahobavuka Habimana Honorine[3], and Chantal Kabonyi Nzabandora[4]

[1]Observatoire Volcanologique de Goma, Département de Géochimie et Environnement, R.D. Congo

[2]Institut Supérieur Pédagoque d'Idjwi, RD Congo

[3]Université de Kisangani, Facultés des Sciences, Département de Biologie, R.D. Congo

[4]Université Officielle de Bukavu, Département de Biologie, R.D. Congo

ABSTRACT: This study conducted at the Eastern DR. Congo, the island Idjwi on plants used in the treatment of asthma falls 21 plant species. The decoction is the preparation method most used remedies with 15 species (68.1%). The oral route of administration is the most used with 18 species (81.8%). Among the organs of plants, the leaves take first place as staff members with 16 species (72.7%). The disease is common in Idjwi, the most observed cases cardiac asthma is mainly because most of the patients neglect the onset of the disease and the symptoms are difficult to observe amber even by specialists in this field. These different forms of the disease are caused by either hereditary or even environmental effects.

KEYWORDS: Medicinal plants, asthma, treatment, disease.

RÉSUMÉ: Cette étude menée à l'Est de la RD. Congo, à l'ile d'Idjwi sur les plantes utilisées dans le traitement de l'asthme relève 21 espèces végétales. La décoction est le mode de préparation des remèdes le plus employé avec 15 espèces (soit 68.1%). La voie buccale constitue le mode d'administration le plus utilisé avec 18 espèces (soit 81.8%). Parmi les organes des plantes, les feuilles occupent la première place comme organes employés avec 16 espèces (soit 72.7%). La maladie est fréquente à Idjwi, le cas le plus observé est surtout l'asthme cardiaque, car la plus part des patients négligent le début de la maladie et les symptômes sont difficiles à observer d'ambré même par les personnes spécialisées dans ce domaine. Ces différentes formes de la maladie sont soit causées par les effets héréditaires ou même environnementaux.

MOTS-CLEFS: Plantes médicinales, asthme, traitement, maladie.

1 INTRODUCTION

La forte croissance démographique et l'insuffisance des infrastructures médicales constituent des problèmes majeurs auxquels se heurtent les africains. Face à cette situation, il s'avère impérieux de trouver des solutions adéquates et immédiates.

A cet effet, le recours à la médecine traditionnelle se révèle comme un aspect important parmi tant d'autres pour résoudre ce problème.

D'après POUSSET (1989), la médecine traditionnelle se justifie en particulier dans le traitement de nombreuses infections que le médecine moderne ne maitrise pas encore et montre que de nombreuses plantes utilisées telles qu'elles, sont aussi efficaces que les médicaments importés par l'Afrique.

De ce fait, nous avons voulu chercher une solution sur le traitement de l'asthme, maladie pulmonaire d'essoufflement, caractérisée par une difficulté à aspirer de l'air inspiré qui survient souvent par une crise. La mortalité peut intervenir vite.

Aussi d'autres infections (tuberculose, sida, toux) sont favorisées. Les dyspnées conduisent à l'insuffisance cardiaque selon l'OMS en 1999.

Plusieurs travaux ont été réalisés sur les plantes médicinales dans la ville de Bukavu et ses environs, mais aucune n'a été réalisée à Idjwi. On peut signaler que certains chercheurs ont parlé de certaines plantes qui traitent l'asthme ou plantes utilisées pour d'autres maladies, sans évoquer la thérapie asthmatique. Il s'agit notamment des travaux de WOME (1985), LOMBA (1988, 1990), ATHALO (1988), MANDAGO et UDAR (1994) et OMARI (1996).

Ailleurs, nous pouvons citer les travaux de DJANOHOUN et al. (1996, 1989), BOUKEF (1986) et POUSSET (1986) et même le travail de LAVERGNE et VERA (1989) sur la pharmacopée traditionnelle de la Réunion (France).

L'asthme (du grec asthma, respiration difficile) est une infection respiratoire caractérisée par des crises des dyspnées surtout expiratoires liées aux spasmes, à la congestion et à l'hypersécrétion des branches selon BERNARD et GENEVIENNE (1989), c'est une maladie généralement bronchique prédominante qui se définit sur le plan :

- anatomique, par un spasme bronchique avec sécrétion
- biologique, par une éosinophilie dans le sang,
- clinique, par une dyspnée ou difficulté à la respiration paroxystique à type de bradypnée expiratoire d'après FABIANTO (1995).

Suivant son diagnostique, on distingue quatre sortes d'asthme : asthme extrinsèque, intrinsèque, intrique et cardiaque. La maladie, sévit à différents âges, mais surtout avant l'âge de 45 ans. 50% des malades se manifestent avant 10 ans, 30% avant 40 ans. Avant l'âge de 20 ans, le rapport est de deux hommes pour une femme. Si aucun parent n'est asthmatique, la maladie est rare chez les enfants et s'il apparait c'est généralement au-delà de 20 ans. Si un des parents est malade, le pourcentage d'enfants allergiques malade s'élève à 33% mais si les deux parents sont malades, 50% d'enfants le seront aussi.

Les facteurs ou stimuli de la maladie sont généralement liés aux allergènes qui agissent soit directement sur les réceptions vago-bronchiques en provoquant les broncho-constructions reflexes. Ils peuvent aussi favoriser la libération des médiateurs chimiques par les mastocytes et/ou des basophiles. Les autres stimuli sont : les facteurs environnementaux, les facteurs d'origine professionnelle, les effets émotionnels, psychologiques, pharmaceutiques et les affections virales.

La maladie est très fréquente à Idjwi, suivant les statistiques obtenues dans deux grands hôpitaux et dix centres de santé de la place avec 4.2% sur la totalité des maladies enregistrées de 2000 à 2012.

2 MILIEU D'ÉTUDE

L'ile d'Idjwi est notre milieu d'étude. Elle se situe à l'Est de la R.D.Congo en Province du Sud-Kivu et couvre une superficie de 680 km^2, soit 1/9 de toute l'étendue du lac Kivu dont 310 km^2 des terres émergées et 370 km^2 des eaux territoriales (Balleiy, 1936).

Elle est située entre la latitude 1°59' et 2°28' Sud et la longitude 29°05' et 28°26' Est suivant l'allongement NNE-SSW dans la zone axiale du lac Kivu.

Elle est limitée au Nord par la province du Nord Kivu, au Sud et à l'Est par la République Rwandaise, à l'Ouest par les territoires de Kabare et Kalehe. Quant à la subdivision administrative, elle comprend deux chefferies dont celle de Ntambuka au Sud et celle de Rubenga au Nord.

3 MATÉRIELS ET METHODES

Le matériel biologique est constitué des vingt-deux espèces des plantes récoltées pendant nos enquêtes dont l'herbier de référence a été constitué et conservé à l'Observatoire Volcanologique de Goma ; Département de Géochimie et Environnement.

La méthode utilisée est celle d'enquête ethnobotanique qui est un questionnaire constitué à l'avance et qui nous a permis d'appréhender les plantes traitant l'asthme à l'ile d'Idjwi. Plusieurs couches de la population (cultivateurs, tradipraticiens, guérisseurs, apiculteurs, médecins, etc.) ont été soumis à ce questionnaire formulé de la manière suivante :

1. connaissez-vous la maladie appelée asthme ? si oui, comment se manifeste-t-elle ?
2. connaissez-vous quelques plantes utilisées dans le traitement de l'asthme ?
3. pouvez-vous les montrer ?
4. Quelles sont les noms vernaculaires de ces plantes ?
5. Quel est l'organe utilisé pour obtenir le remède à partir de ces plantes ?
6. Quelle est la quantité précise qu'on utilise pour préparer le remède ?
7. Quelles sont les autres plantes que vous utilisez dans la préparation des remèdes à partir de ces plantes ?
8. Comment présente-t-on les remèdes obtenus à partir de ces plantes ?
9. Quelle est la durée du traitement ?
10. Ces remèdes sont-ils toxiques ? Si oui à quoi est du cette toxicité ?
11. Y-a-t-il une interdiction ou contre indication à observer pendant la durée du traitement ?
12. Quels sont les effets secondaires du remède ?
13. Quelle est la dose utilisée dans le traitement ?

L'identification de matériels récoltés a été faite sur le terrain et à l'Observatoire Volcanologique de Goma par comparaison avec l'herbier de référence. Nous avions aussi réalisé des analyses de types écologiques et biologiques au laboratoire.

L'identification des spécimens a été guidée par des différentes flores du Rwanda-Urundi (Troupin, 1978, 1983, 1985, 1988) et le concours de spécialistes en Botanique.

4   RÉSULTATS

A. ENQUETES ETHNOBOTANIQUES

Les plantes antiasthmatiques inventoriées sont présentées dans l'ordre alphabétiques des familles, genres et espèces. Pour chaque plante recensée, nous donnons son nom scientifique, le nom vernaculaire (NV), l'organe utilisé (OU) ainsi que son usage médicinal. Enfin viennent les effets secondaires (ES) si possible.

1.   *Acanthaceae*

1.1. *Brillantaisia patula* T.Anders (S-arb, Cher, Cult, Guin), NV : Lwibaye, OU : Feuille.

Cinq cents grammes des feuilles fraiches sont macérées dans un litre d'eau pendant 12 heures. On prescrit en voie rectale pendant 6 jours à raison d'un irrigateur une fois par jour.

2.   *Agavaceae*

2.1. *Agave americana* L. (Hvi, NaPh, Cult, Pan), NV: Ecinusi, OU: Feuilles.

Un pilat d'environ 300 grammes de feuilles est mélangé avec 4 cuillerées d'huile d'*Elaeis guinensis* JACQ. Le remède est appliqué au niveau du thorax et du dos par bandage. Cet usage dure cinq jours.

3.   *Anacardiaceae*

3.1. *Mangifera indica* L. (A, MsPh, Cult, Pan), NV: Hembe ou Eyembe, OU: Feuilles.

La décoction d'environ 500 grammes des feuilles fraiches dans 2 litres d'eau pendant environs 20 minutes. La prescription se fait par voie buccale à raison d'un verre à bière chaque matin pendant quatre jours.

4.   *Arecaceae*

4.1. *Elaeis guineensis* Jacq. (A, Msph, Cult, Pan**),** NV: Ngazi ou Engazi, OU: tronc.

Bruler 400 grammes du tronc associé avec 5 grammes et 10 grammes respectivement de racine de *Bidens pilosa* L. et *Ricnus communis* L. Mélanger avec une pincée du sel gramme. Le traitement se fait par le tatouage en imbibant le produit au niveau du thorax, une fois par jour pendant trois jours.

5.   *Asteraceae*

5.1. *Ageratum conyzoides* L. (Han,Tsc, Ség, Pan), NV: tolufu (Lokele), OU: plante entière.

Bouillir une quantité d'environ 500 grammes de plantes entières dans deux litres d'eau pendant 30 minutes. Le remède est prescrit par la voie buccale à la dosse d'une tasse à café par jour pendant au moins 6 jours.

5.2. *Bidens pilosa* L. (Han, Tsc, Rud, Pan), NV: Kashisha, OU: plante entière.

Faire griller une quantité d'environ 100 grammes, y ajouter une pincée de sel gramme. Le traitement se fait par tatouage deux fois au niveau du thorax, en imbibant le produit. Cet usage dure 3 jours. La même plante est utilisée en pilant 500 grammes de feuilles fraiches associés avec 5 cuillerées de soupe d'huile d'*Elaeis guineensis* Jacq. Le remède est appliqué au niveau du thorax et appuyé par ruban. Le traitement dure six jours.

5.3. *Helianthus annus* L. (Han, Tsc, Cult, Afr-am), NV: Bisapo, OU : fruits (graines).

Faire broyer 20 graines (akènes) par une prise le matin avant de brosser les dents jusqu'à la guérison.

5.4. *Microglssa pyrifolia* (Lam) O.Kuntze (L, Phgr, Jach-arb, Pal), NV : - , OU : fruits.

½ Kg des fruits bouilli dans deux litres d'eau jusqu'à obtenir 1 litre, le décocté est bu à raison d'un verre à bière par jour pendant 15 jours.

6. *Brassicaceae*

6.1. *Brassica oleracea* (L) CZ.ENJ**. (**Han, Tsc, Cult et Cosm**),** NV : Shu, OU : feuilles

La préparation de 50 grammes de feuilles dans ½ litre pendant 30 minutes. Le décocté ainsi obtenu est prescrit par voie buccale à la dose de trois cuillérées à soupe pendant une semaine.

7. *Caricaceae*

7.1. *Carica papaye* L. (Arb, McPh, Cult, Pan), NV : Papaye, OU: Feuilles

Une feuille fraiche chauffée au feu ou mis au soleil en vue d'être utilisé comme remède par massage au niveau de thorax jusqu'à la guérison.

8. *Cucurbitaceae*

8.1. *Curcuma longa* L. (Hvi, Grh, Cult, Afr-am), NV:-, OU : Feuilles.

La décoction de 300 grammes de feuilles fraiches est additionnée à un pilât de 50 grammes de *Cymbopogon citratus* (Des.) Stoph. bien infuser. La prescription se fait par voie orale à la dose d'un verre à bière par jour pendant une semaine.

9. *Combretaceae*

9.1. *Terminalia catapa* L. (A, MsPh, Cult, Pan), NV : Madame, OU : Feuilles

Bouillir 15 à 20 feuilles fraiches dans 1litre d'eau pendant 20 minutes.

Après avoir le décocté, le traitement se fait par voie orale en raison d'une prise par jour pendant six jours.

10. *Commelinaceae*

10.1. *Commelina diffusa* Burm.F. (Hvi, Tsc, Rud, Pan), NV : Murheja, OU : Plante entière

La décoction d'environ 500 grammes de plantes entières fraiches décomposées dans 2 litres d'eau pendant 30 minutes. Le décocté est bu à raison d'un verre à bière trois fois par jour pendant 4 jours.

11*. Euphorbiaceae*

11.1*. Euphorbia hirta* L. (Han, Tsc, Rud, Pan), NV: -, OU: Plante entière.

La cendre provenant d'une quantité d'environ 50 grammes de la plante entière est mélangée avec trois cuillérées d'huile d'Helaeis guineensis Jacq. Le traitement se fait en léchant le remède cinq fois par jour ou bien le décocté obtenu de 100 grammes des plantes entières est bu à la dose d'un verre à bière par prise, deux fois par jour pendant cinq jours.

11.2. *Alchornea cordifolia* (Schum et Th.) Hull. Arg. (Arb, McPh, Jach-arb, Aftr-tr), NV: , OU: Feuilles.

Une décoction aqueuse de 2 Kg de feuilles fraiches dans 2 litres d'eau pendant 30 minutes. Le décocté est bu à la dose d'un verre à bière par jour pendant 6 jours. Dans le cas de l'asthme cardiaque, le patient prendra un verre à bière trois fois par jour durant une semaine.

11.3. Euphorbia milli DES Moul. (S-arb, Naph, Cult, Pan), NV : épine de Jésus ; OU : Tige.

On extrait environs sept gouttes de latex de la tige qui sont additionnées avec un demi-verre d'huile de *Ricinus communis* L. Après l'homogénéisation, le remède est bu à raison d'une cuillérée à soupe deux fois par jour, matin et soir pendant sept jours.

11.4. ***Ricinus communis*** L (Arb, McPh, Cult, Guin), NV :Mubonobono, OU : Feuilles.

La décoction d'environs dix feuilles fraiches dans 2 litres d'eau pendant 30 minutes. Le décocté est bu à raison d'un verre à bière par jour pendant 5 jours.

*12.   **Fabaceae***

12.1. *Desmodium rependum* (Sw) DC. (Han, Cher, Rud, Afr-am) NV: Irhuza ,OU : Feuilles.

Le pillât d'environs 200 grammes de feuilles fraiches est mis dans un verre à bière additionnée de trios pincés de sel de cuisine mais de préférence le sel gemme. Après filtration, la prescription de médicament se fait par voie buccale en raison d'une cuillérée à soupe par jour pendant une semaine.

13.   *Lilliaceae*

13.1. *Allium sativum* L. (Han, Gbu, Cult, Cosm), NV: Matunguru, OU: Squames.

Le pillât d'environs 50 grammes de squames est bouilli dans 75mm d'eau. Le décocté est bu en raison de 7 cuillérées à soupe trois fois pendant 4 jours.

14.   *Moraceae*

14.1. *Ficus vallis-choudae* Del (A, MePh, Rud, Afro.trop), NV : Mucucu (Mutudu), OU : Ecorce du tronc.

Bouillir 300 grammes d'écorces de tronc dans 2 litres d'eau pendant 20 minutes. Le décolté est bu en raison d'un verre à bière deux fois par jour, matin et soir durant 5 jours.

14.2. *Musanga secropioides* R. Br. (A, MePh, FoS, Guin), NV :   OU : Feuilles.

Le remède est obtenu à partir d'une décoction d'un kilogramme de feuilles pilées fraiches dans 3 litres d'eau. Le traitement se fait par fumigation une fois par jour, le soir et cela pendant huit jours.

15.   V*itaceae*

15.1. *Cyphostemma adenocaule* (STEND. EX. A. RICH) DESC. (Lian, Phgr, Jach-arb, Guin), NV: , OU: Feuilles.

Faire macérer sept feuilles dans ½ litre d'eau pendant 6 heures. Le remède est prescrit par voie buccale à la dose d'une tasse à café, trois fois par jour pendant 4 jours.

16. **Zingiberaceae**

16.1. *Afromomum laurentii* (DEWILD & TH.DIR) SHUN.), (Hvi, Grh, Jach-arb, Cong), NV: -, OU: Fruits

L'infusion de 200 grammes de fruit est mélangée avec 30 grammes de feuilles de *Cnestis furruginea* L. dans 2 litres d'eau. Le remède est bu à raison d'un verre à bière une fois par jour durant une semaine.

B ETUDE DE LA FLORULE DES ESPECES RECENSEES

a. Analyse des familles

L'analyse floristique de notre florule après investigation révèle que les Spermatophytes sont les plus représentés. Les familles *Asteraceae* et *Euphorbiaceae* sont les plus diversifiées avec chacune 4 espèces ; elles sont suivies de la famille *Moraceae* avec 2 espèces, alors que les autres familles ne renferment qu'une seule.

L'importance des *Euphorbiaceae* a été soulignée aussi par MABIKA (1983), WOME (1985), MANGAMBU (2008), ATAHOLO (Op.cit), ONGENDANGENDA (Op.cit) et OMARI (Op.cit) dans leurs investigations. Cette famille renferme des espèces qui ont beaucoup de molécules bio-actives avec des grands groupes phytochimiques utilisées en médecine d'après Pierre LIEUTAGHI (2006) cité par MANGAMBU (Op.cit).

Tableau I. Representation des espèces par famille

N°	Familles	Nombre d'espèces
1	*Acanthaceae*	1
2	*Agavaceae*	1
3	*Anacardiaceae*	1
4	*Arecaceae*	1
5	*Asteraceae*	4
6	*Brassicaceae*	1
7	*Caricaceae*	1
8	*Cucurbitaceae*	1
9	*Combretaceae*	1
10	*Commelinaceae*	1
11	*Euphorbiaceae*	4
12	*Fabaceae*	1
13	*Lilliaceae*	1
14	*Moraceae*	2
15	*Vitaceae*	1
16	*Zingiberaceae*	1
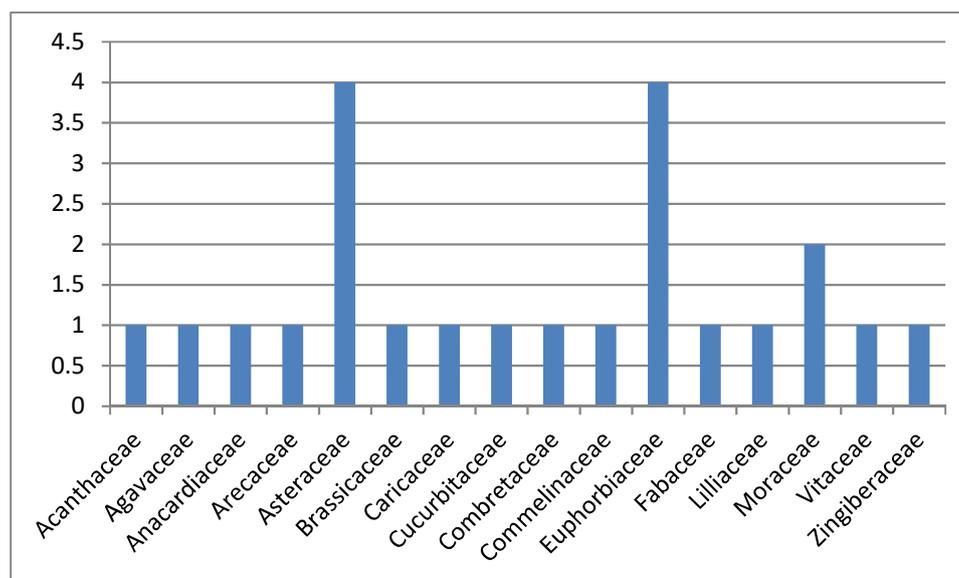
Fig.1. Spectre de distribution des espèces par famille.

b. Analyse des types morphologiques

Les types morphologiques sont dominés par les plantes herbacées sur les ligneuses. Les plantes ou herbes annuelles (Han) sont dominants dans nos inventaires et représentées par 7 espèces (soit 31.8%), suivie par les herbes vivaces (Hvi) et les arbres (A) avec chacun 4 espèces (soit 18.1%), viennent les arbustes avec 3 espèces (soit 13.6%) et enfin les lianes (Lian) et les sous-arbustes (S-arb) avec chacun 2 espèces (soit 9%). A ce niveau, nos résultats sont contraire aux travaux des ATAHALO(Op.cit.), LOMBA (1990), ONGENDANGENDA (Op.cit.), OMARI (Op.cit.) et MANGAMBU (Op.Cit) qui ont mis en évidence la dominance des espèces ligneuses et des arbres.

Tableau II. Tableau des Types Morphologiques

N°	Types Morphologiques (TM)	Pourcentages (%)
1	Herbes Vivaces (Hvi)	18.1
2	Herbes annuelles (Han)	31.8
3	Arbres (A)	18.1
4	Arbustes (Arb)	13.6
5	Sous-arbustes (S-arb)	9
6	Lianes (Lian)	9
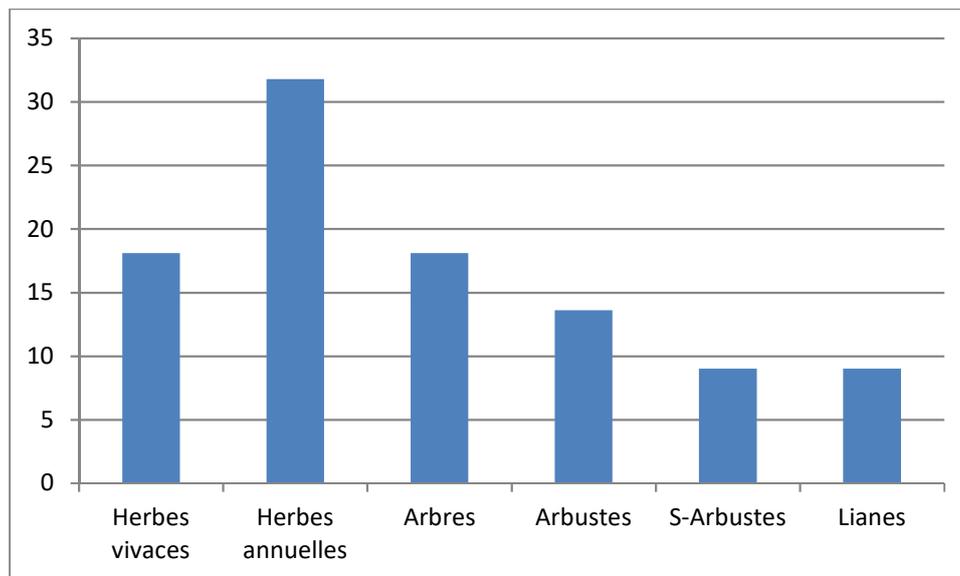
Fig.2. Spectre des types morphologiques des espèces

c. Analyse des Types Biologiques

Au niveau les types biologiques, les phanérophytes (Ph) comptent 12 taxons (soit 49 %) de l'ensemble des espèces inventoriées. Ils sont suivis des Thérophytes (5 espèces, soit 21.7 %). Les Chaméphytes et les Géophytes viennent en dernier lieu avec 3 espèces soit 13% chacun.

Tableau III. Tableau des types biologiques des espèces

N°	Types biologiques	Pourcentages (%)
1	Chaméphytes (Ch)	14.7
2	Phanérogames (Ph)	49
3	Thérophytes (Th)	21.6
4	Géophytes (G)	14.7
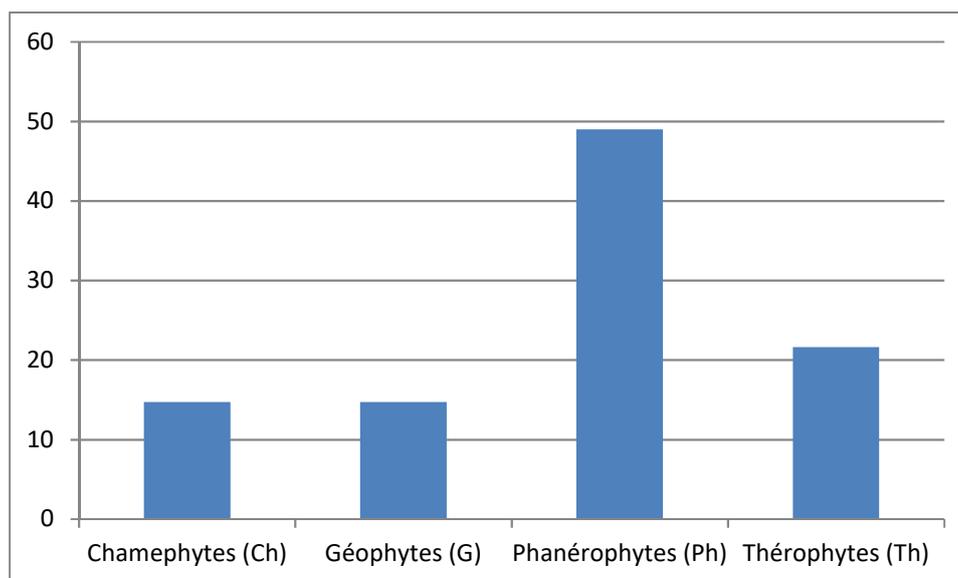
Fig.3. Spectre des types biologiques des espèces

d. Analyse des types d'habitats

Suivant leurs types d'habitat, les espèces cultivées sont plus représentées avec 12 espèces (soit 54%) ; elles sont suivies des espèces de jachères arbustives (Jach-Arb) avec 4 espèces (soit 18.1 %). La forte présence des espèces cultivées nous pousse à dire qu'à l'ile d'Idjwi les écosystèmes forestiers naturels sont presque absents et que la majorité des plantés cultivées sont utiles selon plusieurs usages d'après LION et GERMOSEN-ROBINEAU (1997) in PIERRE LIEUTAGHI (Op.cit) cité par MAGAMBU (Op.cit).

C'est par exemple le cas de la réserve forestière de Nyamusisi qui a été complètement détruit suite aux actions anthropiques.

Tableau IV. Tableau de distribution de types d'habitats des espèces

N°	Types d'habitats	Pourcentage (%)
1	Cultivées	52.2
2	Ségetales	4.3
3	Rudérales	21.7
4	Jachères arbustives	17.4
5	Foret secondaire	4.3
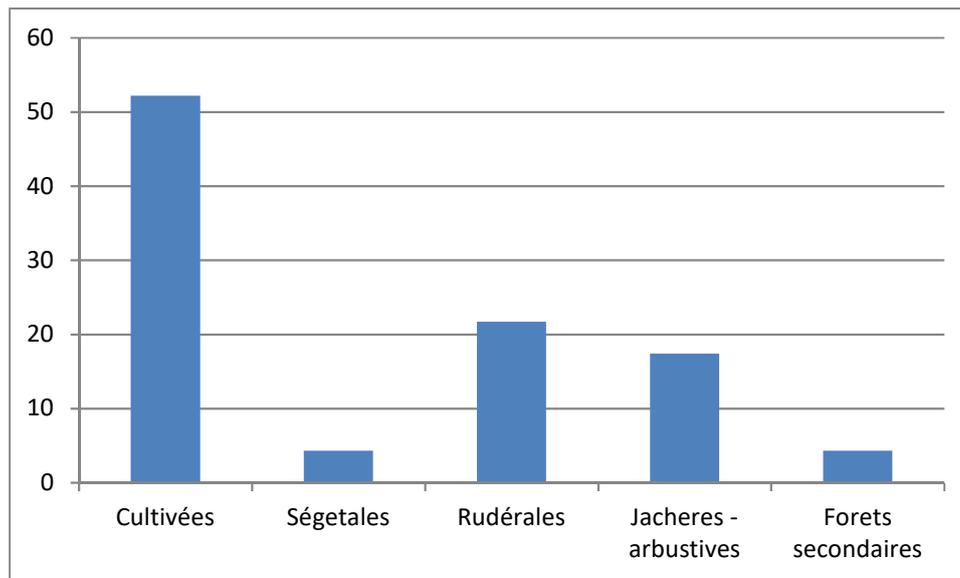
Fig.4. Spectre des types d'habitats

e. Analyse de la distribution phytogéographique des espèces

En ce qui concerne la distribution phytogéographique, nous remarquons que les espèces pantropicales (Pan) sont les plus abondantes avec 10 espèces (soit 43.5%), suivies des espèces Guinéennes (Guin) avec 4 taxons (soit 17.4%) et afro-Amériques(Afro.am) avec 3 espèces dans nos inventaires. Les espèces Cosmopolites (Cosm) et Afro-tropicales sont représentées par 2 espèces chacune, tandis qu'il n'ya qu'une espèce Afro tropicale (Afro-trop) et congolaise (Cong.).

Tableau V. Tableau de distribution des espèces recensées

N°	Distribution géographique	Pourcentage (%)
	Guinéenne (Guin)	17.4
	Pantropicale (Pan)	43.5
	Afro-Amérique (Afr-am)	13
	Paléotropicale (Pal)	4.3
	Cosmopolite (Cosm)	8.7
	Afro-tropicale (Afr-trop)	8.7
	Congolaise (Cong.)	4.3
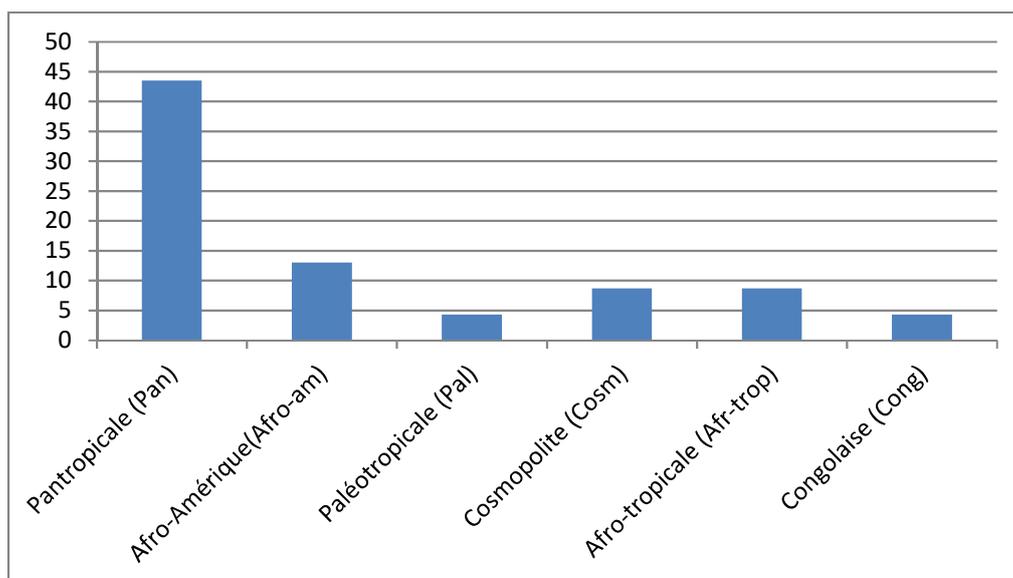
Fig.5. Spectre de distribution phytogéographique des espèces

5 DISCUSSION

D'après nos investigations, certaines espèces ont été citées au moins par 5 à 8 tradipraticiens lors de l'enquête ethnobotanique. Ce sont : *Alchorneaa cordifolia, Brillantaisia patula, Euphorbia hirta, Ricinus comminus, Mangifera indica, Afromomum laurentii et Allium sativum*

D'autres espèces récoltées pour le traitement de l'asthme dans le territoire d'Idjwi et dans d'autres régions de la RD. Congo sont cités dans d'autres travaux antérieurs pour les mêmes usages en Afrique et dans les autres pays du monde.

Ainsi, Wome (1985) et Lomba (1988) dans leurs travaux ont reconnu que les espèces *Allium sativum, Canarium schwenfurthii, Morinda lucida*, sont utilisées ²pour le traitement de l'asthme à Kisangani. Tandis que ATAHOLO (Op.cit) a signalé dans ses investigations que les espèces *Afromomum laurentii, Canarium schwenfurthii, Commelina diffusa, Dacryodes edulis, Ficus exasperata, Thomandersia hensii*, sont utilisées dans le traitement de l'asthme dans la région de Buta.

Lomba en 1990 fait remarquer que l'asthme est parmi les maladies fréquentes de Kisangani, les plantes suivantes y sont utilisées pour son traitement : *Afromomum laurentii, Ageratum conyzoides, Allium sativum, Brassica junccea, canarium schwenfurthii, Euphoorbia hirta, Dacryodes edulis, Mangifera indica, Ricinus communis, Terminalia catappa, Thuya orientalis*, etc .

Omari dans ses investigations en 1997, a cité les espèces suivantes utilisées par les Kumu de Wania Rukara : *Achomanes giganteus, Artocarpus incisa, Canarium schwenfurthii, Cola giganteus, Cymbopognon citratus, Mangifera indica, Ocimum canum, Ricinus communis, Terminalia catappa, Thomandersia hensii et Xylopia aethiopica.*

Au niveau de l'Afrique, d'après les travaux d'Adjanohoun et al. (1996-1989) nous pouvons citer les espèces suivantes qui sont utilisées dans le traitement de l'asthme : *Curcuma longa, Ageratum conyzoides, Cymbopogon citratus, Euphorbia hirta, Ocimum canum, Tamarindus indica, Tectrorchidium didymastemon, Terminalia catappa, Terminalia chebula, thomandersia hensii*. BOUKEF (1986) inventoriant les plantes médicinales de la Tunisie, a cité *Agave americana, Allium sativum, Euphorbia hirta, Helianthus annuus et Ricinus communis.*

LAVERNE et VERA (1989) dans leur travail sur la pharmacopée traditionnelle de la Réunion (France), ils ont reconnu que les espèces : *Agave americana, Azadirachta indica, Commelina difusa, Curcuma longa, Mangifera indica, Ricinus communis* et *Euphorbia hirta* sont utilisées dans le traitement de l'asthme dans la phytothérapie de la Réunion.

Nous pouvons dire que parmi nos résultats d'investigation dans l'ile d'Idjwi 15 espèces sont déjà cités par d'autres auteurs et 7 sont notre contribution.

De tous les modes de préparation des remèdes reconnus dans notre travail, la décoction est le mode le plus utilisé dans le traitement de l'asthme à idjwi. Elle compte 15 préparations d'espèces (soit 68.1%). Elle se rencontre aussi chez Wome (1997, 1985, 1988), Lomba (1988, 1900) et Omari (Op.cit).

Quant au mode d'administration des remèdes des espèces inventoriées pour le traitement de l'asthme à Idjwi, la voie buccale constitue le mode le plus employé. Elle compte 18 espèces (81.8%). Ce mode a été aussi reconnu par Wome (1977, 1985, 1988), Lomba (1988, 1900), Mandango et Bambole (1988), Lavergne et Vera (1989), Polygenis (1990), Udar et Mandango (1994), Omar (Op.cit).

Parmi les organes utilisés, les feuilles avec 16 espèces (soit 72.7%) et les plantes entières avec 6 espèces (22%), sont les deux organes végétaux les plus utilisés. Ceci est confirmé par Gustave (1997), Lavergne et Vera (1989), Lion et Germosen-Robineau (1997) tout en précisant que la feuille est l'organe le plus utilisé en médicine traditionnelle par les praticiens tandis que les plantes entières sont plus utilisées dans les villes car ces dernières sont caractérisées le plus souvent par des plantes rudérales et ségétales. Le dosage des médicaments et la posologie ne sont pas bien précis car ils varient d'un praticien à un autre.

L'homme recourt toujours aux plantes et cherche chez celles-ci des remèdes pour réparer l'une à l'autre des infections de l'organisme, selon ABJANOHOUN et al. (1994). Nous avions inventoriés 22 espèces des plantes utilisées contre l'asthme à l'issu de nos inventaires, parmi lesquelles 15 espèces ont été déjà cités dans la littérature consultée et 7 espèces constituent notre modeste contribution.

La maladie est fréquente à Idjwi ; le cas le plus marqué est surtout l'asthme cardiaque, car la plus part des patients négligent le début de la maladie et les symptômes sont difficiles à observer d'ambré même par les spécialistes. Ces différentes formes de la maladie sont soit causées par les effets héréditaires, environnementaux, etc. Il semble selon les fréquences de ces formes que l'asthme extrinsèque et cardiaque ont une fréquence élevée par rapport aux autres formes.

L'analyse floristique de nos résultats sur les plantes utilisées contre l'asthme à Idjwi montre que les spermaphytes sont les plus représentées. Les familles *Asteraceae* et *Euphorbiaceae* sont les plus diversifiées, représentées chacune avec 4 espèces (soit 18.1%), elle est suivie de la famille *Moraceae* avec 2 espèces (soit 9%) et les autres familles ont chacune une seule espèce.

Les types morphologiques sont dominés par les plantes ligneuses sur les herbacées, tandis que suivant leurs types d'habitat, les espèces cultivées sont plus recensées avec 11 espèces (soit 50%). Ce qui explique l'absence des espaces forestiers naturels à Idjwi.

Suivant l'ordre de la distribution phytogéographique, les espèces pantropicales (Pan) sont les plus abondantes avec 10 espèces (soit 45.4%),

La décoction est le mode le plus utilisé dans le traitement de l'asthme à Idjwi, elle compte 15 préparations d'espèces (soit 68.1%) et la voie buccale constitue le mode le plus employé avec 17 espèces, soit 77.3%.

Parmi les organes utilisés, les feuilles avec 16 espèces (soit 72.7%) et les plantes entières avec 6 espèces (soit 27.3%), sont les deux organes végétaux les plus utilisés.

Nous disons que l'ile d'Idjwi devra être sérieusement reboisée compte tenu de l'absence des forets primaires et   de l'anthropisation qui s'accélère du jour le jour.

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الصكوك وآفاق تمويل الإقتصاد المغربي

[The Sukuk and the challenges for financing the moroccan economy]

Abdelati HAKMAOUI[1] and Hafssa YERROU[2]

[1]Department of Economics, FSJES Ain Sebaa,
Hassan II University,
Casablanca, Morocco

[2]Department of Economics, FSJES Ain Chock,
Hassan II University,
Casablanca, Morocco

ABSTRACT: Morocco is probably a platform with a great potential for the development of Islamic finance. The recent reform of the law, published during the month of September 2013 on securitization introducing Sukuk is able to stimulate the Moroccan financial market and give it its attraction both in terms of mobilizing internal resources underutilized or external resources especially from the countries of the Gulf Cooperation Council. This research aims to highlight how these new instruments of islamic finance such as Sukuk can contribute to the funding of the Moroccan economy. We try to present the different types of Sukuk, their characteristics and their worldwide developments in recent years. In a second axis, we try to understand how these new financial instruments of Islamic finance can be considered as real levers of funding of the Moroccan economy.

KEYWORDS: Islamic Finance, Sukuk, Moroccan Economy, Worldwide sukuk development.

ملخص: يشكل المغرب بلا شك أرضية خصبة لتطور المالية الإسلامية إعتبارا لعدة عوامل إقتصادية ، سياسية وجغرافية. ويعد اعتماد قانون الصكوك الصادر شهر شتنبر الماضي، ضمن الأوراق المالية المتداولة كإجراء من شأنه إعطاء دفعة قوية للسوق المالي المغربي ومنحه حركية وجاذبية لاستغلال الموارد المالية الداخلية والخارجية، خصوصا القادمة من دول الخليج العربي. هدفنا من خلال هذا المقال تسليط الضوء على الصكوك كأداة من أدوات التمويل الإسلامي وذلك أولا عبر إدراج أنواع الصكوك وخصائص كل منها ثم ثانيا التطرق لتطورها عبر العالم خلال السنوات الأخيرة. و أخيرا، سنحاول توضيح الأهمية البالغة للصكوك كأداة واعدة لتمويل الاقتصاد المغربي.

كلمات دلالية: الصكوك، المالية الاسلامية، تمويل الاقتصاد المغربي، التطور العالمي للصكوك .

1 تقديم

تعد الصكوك الإسلامية من أبرز منتجات الصناعة المالية الإسلامية. وقد أصبحت واقعا فرض نفسه في الساحة المالية الدولية. حتى ولت العديد من المؤسسات الإسلامية و غير الإسلامية وجهها إليها لقدرتها اولا على توفير الموارد التمويلية اللازمة للإستثمارات, وثانيا لقدرتها على الموازنة بين المعايير الثلاث : الربحية و السيولة و الأمان من المخاطر.

يشكل المغرب بلا شك أرضية خصبة لتطور المالية الإسلامية إعتبارا لعدة عوامل إقتصادية، سياسية وجغرافية. ويعد اعتماد قانون الصكوك الصادر شهر شتنبر لسنة 2013، ضمن الأوراق المالية المتداولة كإجراء من شأنه إعطاء دفعة قوية للسوق المالي المغربي ومنحه حركية وجاذبية لاستغلال الموارد المالية على المستويين الداخلي والخارجي, خصوصا استقطاب رؤوس الاموال القادمة من دول الخليج العربي.

وبناء على ما سبق، يمكن طرح وصياغة الإشكالية الرئيسية لهذه الدراسة على النحو التالي: ما هو دور الصكوك الإسلامية في تطوير و خاصة تمويل الاقتصاد المغربي و السوق المالي المغربي ؟

هدفنا من خلال هذا المقال تسليط الضوء على الصكوك كأداة من أدوات التمويل الإسلامي وذلك أولا عبر إدراج أنواع الصكوك و خصائص كل منها ثم التطرق لتطورها في العالم خلال السنوات الأخيرة. و ثانيا، سنحاول توضيح الأهمية البالغة للصكوك كأداة واعدة لتمويل الاقتصاد المغربي من خلال تاهيل عدة قطاعات اقتصادية ورفع وثيرة الاستثمار و الادخار.

2   الصكوك و تطورها

الصكوك (جمع صك) وهو وثيقة أو شهادة مالية متساوية القيمة تمثل حصص شائعة في ملكية أعيان أو منافع أو خدمات، أو في ملكية موجودات مشروع استثماري معين أو رأسمال وفقا لما تحدده نشرة الإصدار وتكون قابلة للاستحقاق وفقا لشروط نشرة الإصدار (كمال توفيق حطاب،2009) .

تصدر الصكوك بفئات متساوية القيمة لأن الهدف من ذلك هو تيسير شراء وتداول هذه الصكوك. وبذلك فالصك يشبه السهم الذي يصدر بفئات متساوية ويمثل حصة شائعة في صافي أموال الشركة المساهمة كما أنه يلتقي في ذلك أيضا مع السندات التقليدية التي تصدر بفئات متساوية.

الصكوك تقوم بالأساس على مبدأ المشاركة في الربح والخسارة بصرف النظر عن صيغة الاستثمار المعمول بها. فالصكوك تعطي لمالكها حصة من الربح وليس نسبة محددة مسبقا من قيمتها الإسمية. تحدد حصة حملة الصكوك من أرباح المشروع بنسبة محددة عند التعاقد كما أنهم يتحملون الخسارة بنسبة ما يملكه كل منهم وفقا لقاعدة الغنم بالغرم.

وبصفة عامة الصكوك تمثل حصة شائعة في ملكية أصول أو منافع أو خدمات يتعين توفيرها ولا تمثل دينا على الجهة المصدرة لحاملي الصكوك.

فحسب هيئة المراجعة للمؤسسات المالية الإسلامية(زياد جلال الدماغ،2012) أنواع الصكوك مختلفة ومتعددة أهمها :

صكوك المشاركة : وهي وثائق متساوية القيمة تصدر لاستخدام حصيلتها لإنشاء مشروع أو تمويل نشاط على أساس المشاركة فيصبح حاملي الصكوك هم أصحاب تلك المشاريع. وهي مشابهة لشركات المساهمة.

صكوك المضاربة : يصدرها مضارب لاستخدام حصيلة إصدارها في تمويل نشاط خاص والصكوك هنا عبارة عن عقد يتم بموجبه تقديم مال من طرف ثان ليتاجر به. ويمكن أن يتم عقد صكوك المضاربة بين اثنين فأكثر. والفرق بين صكوك المضاربة وصكوك المشاركة هو أن في حالة صكوك المشاركة كل طرف يسهم بالمال والخدمة، وفي صكوك المضاربة يتحمل رب المال الخسارة وحده ويفقد العامل أجرة عمله، ولكن إذا كان تلف المال بسبب تفريط من العامل أو تعد منه فإنه يتحمل الخسارة.

+ صكوك المرابحة : هذه الصكوك تحمل قيما متساوية يصدرها التاجر أو وكيله بغرض شراء سلعة ما تم بيعها بمرابحة معلومة.

+ صكوك الإجارة : تتعلق بالأعيان والأصول المؤجرة وتحمل قيما متساوية ويصدرها مالك العين المؤجرة أو وكيله وتتجلى المعاملة في بيع العين المؤجرة عن طريق الصكوك ليصبح حاملوها هم ملاك الأصل وكذلك المستفيدون من ريع تأجيره بقدر أنصبة الصكوك التي يحملها كل واحد في الأصل المؤجر.

يبين الجدول أسفله خصائص كل نوع من الصكوك (تقرير مجلس القيم المنقولة ديسمبر 2012) .

جدول 1. أنواع وخصائص الصكوك

قابلية للبيع/ سوق ثانوية	بنية / نوع الأنشطة	نوعية الصكوك
نعم	كراء- تأجير عقارات أو تجهيزات	إجارة
نعم	استغلال أصول (عقارات– تجهيزات – مشاريع)	وكالة
نعم	شراكة	مشاركة
نعم	تسيير واستغلال أصول	مضاربة
لا	إنتاج / تصنيع	سلام
لا	إنشاء / تصنيع	استصناع
نعم	خدمات	ملكية الخدمة
نعم	فلاحة	مزارعة
نعم	فلاحة / سقي	مساقاة
نعم	فلاحة / محصول	مغارسة
لا	بيع	مرابحة

المصدر : تقرير مجلس القيم المنقولة ديسمبر 2012.

هذه الأنواع المختلفة من الصكوك تعوق تطورها بعض المخاطر نذكر منها(هيئة الفتوى والرقابة الشرعية 2014) :

+ مخالفة أحكام الشريعة الإسلامية : بما أن الصكوك أداة مالية بنيت على أحكام الشريعة الإسلامية فإن مخالفتها لأحكام الشريعة في أي فترة من عمر الصك تؤدي إلى أضرار تختلف باختلاف المخالفة ودرجة خطورتها فمن بطلان للصك بصفة نهائية إلى فساد بعض الشروط.

+ المخاطر القانونية : يمكن أن نتحدث عن المخاطر القانونية عندما يوجد تعارض بين النظم والتشريعات السائدة وأحكام الشريعة الإسلامية في بلد معين، حيث يتم إهمال تطبيق أحكام الشريعة الإسلامية عند التحاكم.

+ المخاطر التشغيلية : علما أن الصكوك الإسلامية التي يجوز تداولها يجب أن تكون قائمة على اصول، ومردود هذه الصكوك ناتج عن هذه الأصول. هنا تطرح المخاطر التشغيلية فمثلا نعلم أن العائد الإيجاري في صكوك الإجارة هو عائد الصك فلو تعطلت منافع العين المؤجرة المكونة لصك الإجارة، فلا يجب على المستأجر دفع أي أجرة وبالتالي لن يدر الصك أي عائد.

من هنا يتبين أن صكوك الإجارة القائمة على العقار أقل تعرضا لمخاطر فقدان العائد بسبب تعطل المنفعة من الصكوك القائمة على وسائل النقل والمصانع.

+ مخاطر الدين : فيما يتعلق بصكوك توريق الدمم المدنية المقبولة شرعا، يواجه المستثمرون في هذه الصكوك نوعين من المخاطر هما :

- خطر التأخر في الوفاء : إذا تأخرت عوائد الصكوك التي توزع على المستثمرين (حملة الصكوك) فإنهم سيصابون بأشياء وسيفقدون الثقة ليس فقط في قدرة الأصول على الوفاء وإنما في صفقات التوريق برمتها.
- خطر العجز عن الوفاء : احتمال وقوع هذا الخطر يتعلق بالجدارة الائتمانية للمدين، بحيث يعجز المدين عن الوفاء بسبب التعثر أو الإفلاس. لهذا يجب على المستثمرين اتخاذ الحيطة وتوقع هذا الخطر قبل اتخاذ قرار الاستثمار في الأوراق المالية المصدرة. فغالبا ما نجد ضمانات كافية مقابل تلك الأوراق لتعزيز ثقة المستثمرين بها في أسواق رأس المال.

بالإضافة إلى هذه المخاطر هناك مخاطر أخرى متنوعة نذكر منها : مخاطر تذبذب العائد، مخاطر ارتفاع تكاليف الإصدار ومخاطر تغير أسعار الموجودات محل الصكوك المصدرة.

حسب مجلة الزاوية [1] (Journal Zawya's Quarterly Sukuks Bulletin دجنبر 2013) بلغ حجم إصدارات الصكوك خلال سنة 2013 على المستوى العالمي 119,7 مليار دولار، في حين و حسب نفس المصدر اختتمت سنة 2012 على حجم إصدارات صكوك قدر ب 129 مليار دولار مما يعد سابقة في هذا المجال. وسجل سوق الصكوك مجمل الإصدارات مند سنة 2002 حجم أزيد من 500 مليار دولار. حسب تقرير(S&P) فبراير 2014 يتوقع اصدارات جد هامة بكل من : تونس ,موريتانيا, انجلترا ,ايرلندا, جنوب افريقيا,السنغال و عمان. و لازال الطلب على الصكوك في إرتفاع مستمر بحكم أن أغلبية الإصدارات سيادية وتخص مجالات البنية التحتية والمواد الأولية.

Sukuk Issuance by Domicile and Share (2013)

	USD bln
Malaysia	82.36
Saudi Arabia	14.69
UAE	7.12
Indonesia	5.60
Turkey	4.07
Qatar	2.41
Bahrain	1.68
Pakistan	0.44
Brunei	0.40
Mauritius	0.23
Yemen	0.21
Singapore	0.18
Oman	0.13
Nigeria	0.07
Kuwait	0.04
Gambia	0.04
Luxembourg	0.02
UK	0.01
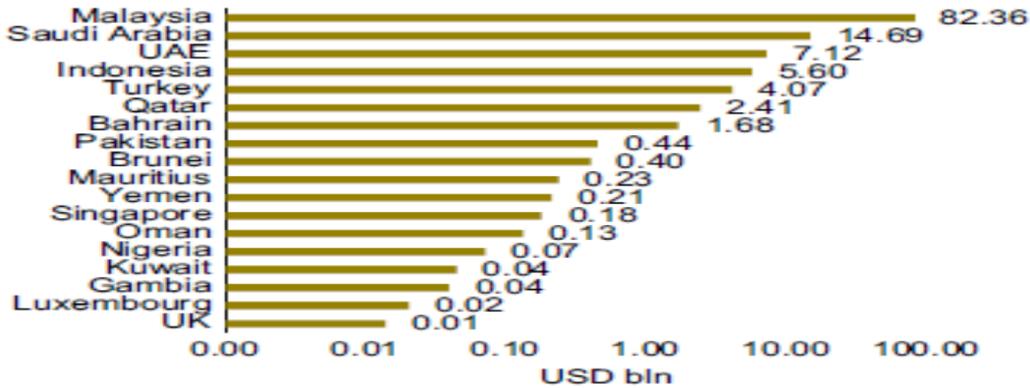
Source: Bloomberg, IFIS, Zawya, KFHR

وثيقة. 1. حجم إصدارات الصكوك خلال سنة 2013

Global Sukuk New Issuances by Domicile (2013)
Source: Bloomberg, IFIS, Zawya, KFH Research Limited

- Malaysia (69%)
- Saudi Arabia (12%)
- UAE (6%)
- Indonesia (5%)
- Turkey (3%)
- Qatar (2%)
- Bahrain (2%)
- Others (1%)
- Pakistan (0.37%)

وثيقة . 2. حجم إصدارات الصكوك خلال سنة 2013 (%)

تحتل ماليزيا مركز الصدارة في مقدمة الدول التي تصدر الصكوك بما قدره 82,36 مليار دولار أي ما يعادل 69% من مجموع الإصدارات على المستوى العالمي لسنة 2013, متبوعة بدولة المملكة العربية السعودية ، الإمارات العربية المتحدة، أندونيسيا و تركية على التوالي بنسبة 12%، 6%، 5%، 3% من مجموع الإصدارات . حاليا يصل عدد الدول التي تصدر الصكوك إلى أزيد من 22 دولة. وحسب المحللين تعزى هذه الزيادة إلى أن عددا من الدول فضلت الاستفادة من هذا المنتوج المالي.

وتمثل الإصدارات المحلية نسبة 73,68% من حجم الإصدارات العام أي ما يعادل 88,2 مليار دولار، في حين الباقي 26,31% أي ما يعادل 31,5% مليار دولار فهي تتداول في السوق الدولية للصكوك.

دائما حسب إحصائيات 2013 وفي إطار الإصدارات المحلية، تتصدر ماليزيا قائمة الدول المصدرة للصكوك المحلية ب 104 مليار دولار أي ما يعادل 74% متبوعة بالعربية السعودية بحجم 10,5 مليار دولار أي 7,5% تليها أندونسيا والإمارات العربية المتحدة بحجم إصدارات يصل إلى 6 مليار دولار لكل منهما، وتحتل قطر المرتبة الخامسة بـ 4,5 مليار دولار. وقد عرف سوق الصكوك متدخلين جدد يتمثلون خصوصا في تركيا التي أصدرت ما يعادل 2,4 مليار دولار.

Global Sukuk Outstanding by Domicile (2013)
Source: Bloomberg, IFIS, Zawya, KFH Research Limited

- Malaysia (59%)
- Pakistan (2%)
- Qatar (7%)
- Saudi Arabia (14%)
- Turkey (2%)
- UAE (8%)
- Others (1%)
- Bahrain (2%)
- Indonesia (5.14%)

وثيقة . 3. الإصدارات المحلية سنة 2013

وإذا ما لاحظنا توزيع حجم الإصدارات حسب القطاعات، تحتل المؤسسات الحكومية المرتبة الأولى بـ 62% دائما حسب إحصائيات مجلة الزاوية لدجنبر 2013. نلاحظ تطور ملحوظ لقطاع الخدمات المالية بحيث يأتي في المرتبة الثانية بـ10% متبوعة بقطاع الطاقة والمواد الأولية بـ 9,4%. ويأتي قطاع النقل في المرتبة الرابعة 7,2%. وتنقسم 11,4% الباقية بين قطاعات الإنشاءات والبناء والغاز والبترول والاتصالات والصناعة الغذائية[2] .
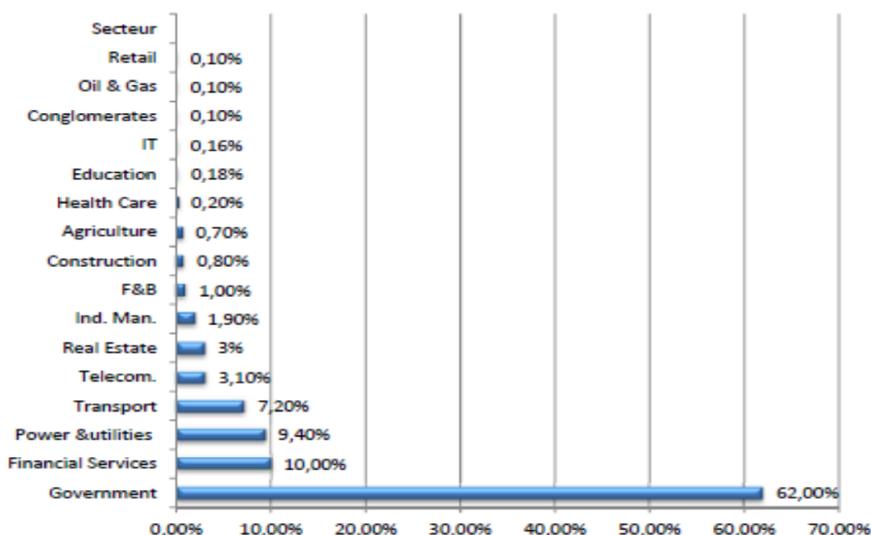
Source : Global Annual Report 2013

وثيقة . 4. توزيع حجم الإصدارات حسب القطاعات

في نهاية 2013، قامت عدة دول بإصدار صكوك بعملات مختلفة، في حين لم يتجاوز عدد العملات 13 نهاية 2012. كما يوضح المبيان أسفله، العملة الأولى لإصدار الصكوك هي الرينكيت الماليزي متبوعة بالدولار الأمريكي والريال السعودي. ويمكن تفسير ذلك بكون ماليزيا التي تتصدر حجم إصدارات الصكوك على المستوى الدولي تستعمل عملتها المحلية، ويحتل الدولار الأمريكي المرتبة الثانية نظرا لكون الصكوك المصدرة من طرف دول مجلس التعاون الخليجي تستعمل الدولار الأمريكي كعملة للإصدار. في نهاية 2012 سجل تواجد لعملات جديدة كالليرة التركية، الأورو واليوان الصين[2].
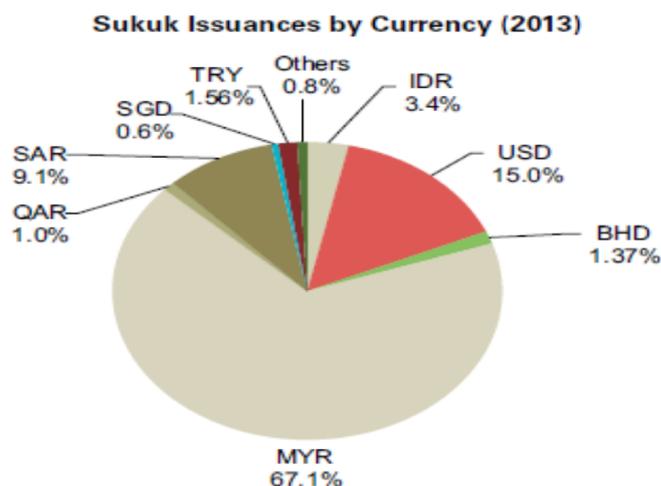
Source : Global Annual Report 2013

وثيقة . 5. توزيع حجم الإصدارات حسب العملات

ويعد السوق المالي بلندن أهم سوق لتداول الصكوك بامتياز على المستوى الدولي بحجم معاملات يصل إلى 7,10 مليار دولار نهاية 2012. ويحتل السوق المالي الإرلندي المرتبة الثانية بحيث يصل حجم المعاملات إلى 4،4 مليار دولار.

يمكن تفسير النمو المتزايد للصكوك خلال السنوات الأخيرة بعدة عوامل نذكر منها(حيدر يونس الموسوي 2011) :

- دعم النمو الاقتصادي وتجنب عجز الميزانية كان سببا في قيام عدة دول بإصدار صكوك سيادية.
- الحاق دول جديدة للدول المصدرة للصكوك نذكر منها على وجه الخصوص تركيا التي اصدرت صكوك سيادية تقدر ب 15 مليار دولار سنة 2012.
- تحظى الصكوك الاسلامية بتصنيف إئتماني جيد إذ أنها تخضع لضوابط شرعية تضم علماء دين يضمنون سلامتها من عمليات توريق للدين المحضورة في إطار قواعد التمويل الإسلامي.

- تحظى الصكوك الإسلامية وقضايا التمويل عموما باهتمام متزايد في الأوساط الغربية مع تزايد شدة الأزمة المالية والانكماش الائتماني العالمي ومخاوف الركود الاقتصادي عبر العالم مما قد يؤدي الى زيادة الإقبال عليها. وقد أصدرت مؤسسة التصنيف الإئتماني ستاندربور وموديز تقريران عن سوق الصكوك في كل القارة الأوربية من طرف المجموعة الألمانية FWU AG شركة الخدمات المالية وهي أول عملية تستعمل برامج وحقوق الملكية الفكرية وذلك حسب عقود إجارة.

- وضع إطار قانوني وتنظيمي يساعد على تطور سوق الصكوك وأحسن مثال على ذلك منطقة شمال افريقيا، مصر، ليبيا، تونس، المغرب وحتى موريتانيا الدين قاموا بعدة إصلاحات تنظيمية وقانونية من شأنها النهوض بإصدار الصكوك وتطويرها.

في المغرب تم نشر القانون البنكي الجديد في الجريدة الرسمية تحت عدد 86184 يوم 5 شتنبر 2013. أما في دول الخليج العربي، قامت سلطة عمان بتدابير مهمة مع Islamic Banking Regulatory Framework وهي تحتل المرتبة السادسة وذات مستقبل واعد في مجال الصكوك. بصفة عامة يتوقع المراقبون تطوراً هاماً خلال السنوات القادمة لصناعة الصكوك عبر العالم.

3   الصكوك : رافعة واعدة لتمويل الاقتصاد المغربي

3.1   الصكوك: رافعة واعدة لتمويل عدة قطاعات إقتصادية

من أجل تعزيز وتيرة النمو الاقتصادي للمغرب (قدر معدل النمو ب 2,7% سنة 2012 و 4,4% سنة 2013 حسب المجلس الأعلى للتخطيط) قام المغرب بنهج استراتيجيات تهدف بالأساس إلى تنمية مختلف القطاعات الانتاجية ومنح النسيج المنتج لكل مقومات التطور والتنمية المستدامة. خلال العقد الأخير، شكلت بعض القطاعات الاقتصادية كقطاع العقار والسياحة والاتصالات قطاعات واعدة ,في حين ظلت قطاعات أخرى كالفلاحة والصيد البحري والطاقة قطاعات حيوية لمستقبل المغرب.

يتوقف تحقيق هذه الاستراتيجية على استثمارات ضخمة تتطلب مصادر تمويلية مهمة، وفي هذا الإطار يمكن لوسائل التمويل الإسلامي أن تلعب دورا بارزا للاستجابة لهذه الحاجة الملحة لمصادر التمويل(عبد الرحمن فتح علي صالح 2008) .

سنتطرق فيما يلي لبعض القطاعات الاقتصادية والدور الذي يمكن للصكوك أن تلعبه في تمويلها [4][3] .

في إطار استراتيجيته لتطوير قطاع السكن، قام المغرب يوضع برنامج يمتد إلى سنة 2020 يرمي إلى تقليص العجز في السكن من 840000 إلى 400000 وحدة سكنية وتحسين جودة وهندسة المجال العمراني والرفع من وثيرة تحقيق مدن بدون صفيح، فمنذ سنة 2010 سجلت المؤشرات الرئيسية لهذا القطاع تطورا إيجابيا وذلك رغم الظرفية الصعبة.

وبالموازاة مع ذلك، وفي إطار النهوض بقطاع السياحة، تبنت الحكومة المغربية استراتيجية رؤية 2020 التي تهدف إلى مضاعفة عدد السياح الأجانب ليصل على 18 مليون سائح وبهذا سيكون المغرب ضمن العشرين وجهة سياحية الأكثر جلبا للسياح على مستوى العالم.

هذه الاستراتيجية ستمكن المغرب من تطوير وتأهيل مناطق سياحية جديدة خلال عقد. في هذا الإطار يمكن للصكوك وخصوصا صكوك الإجارة والاستصناع أن تلعب دورا بارزا في تمويل المشاريع ذات الطابع السكني أو السياحي.

بخصوص قطاع الفلاحة، فان الاستراتيجية الوطنية تهدف إلى إعطاء هذا القطاع ديناميكية ودفعة تنموية بالنظر إلى إكراهات وخصائص هذا القطاع، تعتمد هذه الاستراتيجية على ركيزتين أساسيتين وهما : الفلاحة العصرية والفلاحة التعاونية بمبلغ استثمارات يصل إلى 140 مليار دولار ما بين سنتي 2009 إلى 2018. ويبقى الهدف بالنسبة للفلاحة العصرية هو تطوير فلاحة فعالة تستجيب لمتطلبات السوق بفضل مجموعة من الاستثمارات الخاصة. أما في ما يخص الفلاحة التعاونية فان الهدف يرتكز على تطوير مقاربة تتجه نحو العمل على محاربة الفقر عن طريق الرفع من الدخل الفلاحي للفئات الأكثر هشاشة خصوصا في المناطق النائية.

تقترح هيئة المحاسبة والمراجعة للمالية الإسلامية (AAOIFI) ثلاث أنواع من الصكوك تتماشى مع القطاع الفلاحي بالإضافة إلى صكوك المضاربة، صكوك المشاركة، الإجارة والسلام التي تتلاءم بشكل كبير مع تمويل القطاع الفلاحي.

- **صكوك المزارعة**: وهي أوراق مالية ذات قيمة متساوية تصدر بهدف تمويل مشروع زراعي عن طريق الاكتتاب.

- **صكوك المغارسة**: وهي أوراق مالية ذات قيم متساوية وتصدر بهدف جمع مبلغ عن طريق الاكتتاب لتمويل مشاريع تعنى بغرس الأشجار والمحافظة عليها عبر عقد خاص.

- **صكوك المساقاة**: وهي أوراق مالية ذات قيم متساوية تصدر بغرض جمع مبالغ عن طريق الاكتتاب لتمويل مشاريع تتعلق بسقي الأشجار المثمرة.

من جهة أخرى، وفي إطار المخطط الوطني للنهوض بالقطاع الصناعي، تعهد المغرب بوضع البنيات الأساسية اللازمة في متناول جميع الفاعلين والمتدخلين، تتجلى القطاعات المعنية خصوصا في صناعة الطيران والصناعة الإلكترونية والسيارات والمناطق الحرة، بالإضافة إلى قطاعي الصناعات الغذائية والنسيج والجلد، ولتحقيق هذا المخطط يجب إيجاد مصادر التمويل الأساسية .في هذا الإطار يمكن للصكوك خصوصا صكوك الإجارة والاستصناع أن تلعب دورا هاما وللإشارة فصكوك المشاركة والمضاربة يمكن أن تكون حلولا تمويلية ذات مردودية جد مهمة.

وفي مجال آخر ، ونظرا لكلفة الطاقة الباهظة حيث تثقل ميزان المدفوعات وصندوق المقاصة، نهج المغرب استراتيجية في المجال الطاقي تهدف إلى إيصال الطاقة في أحسن الظروف والمحافظة على البيئة وتعزيز التكامل الجهوي، في هذا الإطار عرف المغرب انطلاق المشاريع التالية :

- مشروع الطاقة الشمسية 2000 MWD بكلفة إجمالية تقدر ب 70 مليار درهم.

- مشروع تقوية البنية التحتية الطاقية عن طريق إنشاء مصفاة ثانية بالجرف الأصفر بتكلفة استثمار تقدر ب 4 إلى 5 مليار دولار.

في أفق 2015 ستنجز مراكز جديدة لإنتاج الطاقة التي تصل كلفتها إجمالا إلى 73 مليار درهم ستمكن من تهيئ قدرة طاقة تصل إلى 3640 ميغا واط. من أجل تمويل هذا القطاع الذي يتطلب برنامج استثماري تقدر كلفته بـ 200 مليار درهم في أفق 2020، ومع محدودية التمويل العمومي يعد اللجوء إلى مصادر تمويلية جديدة ضرورة خصوصا من قبل الشركاء الخواص، في هذا الإطار تعتبر صكوك الإجارة وصكوك الاستصناع حلولا تمويلية ناجعة خصوصا وأن الطاقة مجال ذا إمكانيات عالية يكتسي قيمة مجتمعية وأخرى اقتصادية [3].

في قطاع الصيد، قام المغرب بوضع برنامج "إبحار" في إطار استراتيجية تهدف إلى تطوير قطاع الصيد البحري عن طريق تحديث وسائل الانتاج والبنية التحتية، تطوير فضاءات الزراعة السمكية وتحقيق قطب ذو كفاءة عالية في مجال إنتاج المواد البحرية. تطوير مخطط إبحار يمكن أن يتحقق عبر إصدار الصكوك كصكوك المشاركة والمضاربة والإجارة وكذلك صكوك الاستصناع تعتبر حلولا جد ملائمة لتمويل مثل هذه البرامج.

بعيدا عن كل القطاعات المذكورة سالفا هناك قطاعات أخرى يمكنها الاستفادة من الصيغ التمويلية الاسلامية نخص بالذكر هنا مشاريع البنية التحتية كالطرق السيارة والموانئ بحيث تبلغ كلفة برنامج استثمار المكتب الشريف للفوسفاط 114 مليار درهم ما بين 2010 – 2020 وكذلك برنامج المكتب الوطني للسكك الحديدية بغلاف مالي يقدر بـ 32،5 مليار درهم خلال فترة 2010 – 2015 بصفة عامة، يمكن للصكوك أن تقدم حلولا بديلة ملائمة لتمويل مشاريع بشراكة بين القطاعين الخاص والعام.

يجب يدا عن كل القطاعات المذكورة سالفا هناك قطاعات أخرى يمكنها الاستفادة من الصيغ التمويلية الاسلامية نخص بالذكر هنا مشاريع البنية التحتية كالطرق السيارة والموانئ بحيث تبلغ كلفة برنامج استثمار المكتب الشريف للفوسفاط 114 مليار درهم ما بين 2010 – 2020 وكذلك برنامج المكتب الوطني للسكك الحديدية بغلاف مالي يقدر بـ 32،5 مليار درهم خلال فترة 2010 – 2015 بصفة عامة، يمكن للصكوك أن تقدم حلولا بديلة ملائمة لتمويل مشاريع بشراكة بين القطاعين الخاص والعام [5].

3.2 الصكوك : دور فعال في تقوية وتحريك الادخار العام

مما لاشك فيه، عدد كبير من المغاربة يتحاشون المعاملة مع الأبناك التقليدية نظرا لقناعاتهم الدينية. مما يفسر لجوء العديد منهم إلى اكتناز الأموال في شكل سيولة أو مجوهرات أو عقارات في غياب وسائل ائتمانية تستجيب للقناعات الدينية، أكثر من ذلك، نجد العديد ممن لهم حسابات جارية بالأبناك التقليدية يمتلكون ثروات مهمة، ونظرا لأسباب دينية يرفضون الاستفادة من الفوائد. في هذا الإطار يمكن للصكوك أن تستجيب لهذه الفئة من الطلب على خدمات البنكية. وحيث أن الصكوك وسائل تمويلية مضمونة ذات مردودية مهمة على المدى المتوسط والطويل، فبإمكانها أن تكون أدوات استثمارية للأبناك التجارية على غرار السندات، يمكن إيجاد صيغ تمويلية تتكون من الصكوك ووسائل أخرى تستجيب لمتطلبات المستثمرين مضمونة ذات مردودية وتحترم قواعد الشريعة الإسلامية (نوال بن عمارة 2011) .

نظرا لضعف تعامل المواطنين مع الأبناك بحيث لا تتعدى نسبة الأبناك 47% سنة 2012، يسهل على المصارف الاسلامية أن تلعب دورا في جلب و جمع الادخار على شكل صكوك. حسب دراسة أجريت سنة 2012 من طرف مركز الاستثمارات في التمويل الإسلامي والتأمين 97% من المغاربة يوافقون على التعامل مع المصارف الإسلامية التي تقدم منتوجات مطابقة لقواعد التمويل الإسلامي، أكدت الدراسة نفسها على أن مغربي من بين ثلاث مغاربة مستعدون لادخار أكثر من 700 درهم من دخلهم في إطار منتوجات مالية مقدمة من طرف مصارف إسلامية، ونسبة 25% أي مغربي من أصل أربعة مغاربة مستعدون لإيداع مدخراتهم المالية لمدة تزيد عن سنتين في مصاريف إسلامية. في حصيلة هذه الدراسة أكثر من 70% من الأشخاص المستجوبين أكدوا اهتمامهم البالغ بالمنتوجات المقدمة من طرف المصارف الإسلامية وأكثر من 88% مهتمون بالمنتوجات التمويلية المقدمة من طرف المصارف التي تطبق الشريعة الإسلامية [6].

وبهدف تحديد قدرة وسائل التمويل الإسلامي على جلب المدخرات المؤسساتية، قام مجلس القيم المنقولة (CDVM) بدراسة على عينة من مستثمرين مغاربة. ثبت من خلال الدراسة أن 90% من الأشخاص المستجوبين يعرفون الصكوك وهم مستعدون لإصدارها عندما يسمح بذلك الإطار القانوني والتنظيمي[7].

من جهة أخرى، نشير إلى أن نسبة الأبناك إذا حسبت بطريقة أكثر دقة سنجد أنها لا تتجاوز 24%. فمن وجهة نظر ماكرواقتصادية ضعف نسبة الأبناك ترجع بالأساس لضعف الادخار الوطني مقارنة مع الاستثمار الضروري للحفاظ على نمو اقتصادي متزايد مثلا سنة 2011 قدرمعدل الإدخار (خارج الادخار الوطني والناتج الوطني الإجمالي) بـ 27,9% مقابل 50% بالجزائر، 40,9% بالسعودية و 53,3% بالصين. لفهم حجم المشكل أكثر يجب أن نأخذ بعين الاعتبار اللاتناسب الموجود بين بنية الادخار الوطني على المدى القصير (يتكون من السيولة والحسابات الجارية ...) والحاجة لتمويل الاستثمارات المسجلة على المدى المتوسط والطويل سنة 2011 قدرت هذه الحاجة بـ 36% من الناتج الوطني الإجمالي[7].

بصفة عامة إذا مكنت التدابير المتخذة من تحسين مستوى الادخار سيكون لهذا تأثير إيجابي على مستوى الاستثمار المحقق.

فجميع أشكال الاستثمار المقترحة من طرف المصارف الإسلامية التي ترتكز على تقنيات المساهمة كالمضاربة والمشاركة تعد أكثر ذرا للربح مقارنة بالاستثمارات البنكية التقليدية وخصوصا في فترة انخفاض نسب الفائدة. في حين يمكن للاكتتاب في الصكوك أن يضمن مردودية تتجاوز بكثير مردود الاستثمار المالي التقليدي بالإضافة إلى أن إصدارا لصكوك بإمكانه أن يكون أداة فعالة لجلب الموارد للدولة والفاعلين الاقتصاديين لتمويل مشاريع كبيرة كالبنية التحتية وغيرها...

3.3 الصكوك : آفاق لجلب الاستثمار

الاقتصاد الصاعد كالاقتصاد المغربي في حاجة لمدخرات كافية على المدى المتوسط والطويل وللاستثمارات الأجنبية المباشرة. الهدف هو ضمان تمويل بصفة دائمة لمستوى الاستثمار الذي يعد ضرورة للحفاظ على معدل نمواقتصادي مرتفع ومستقر. لا أحد ينكر العلاقة الوثيقة بين الاستثمار والادخار كمتغيرين مرتبطين ارتباطا وثيقا[8].

يمنح الرأسمال الاستثماري الاسلامي إطارا مناسبا لجلب الاستثمارات الوطنية والأجنبية خصوصا القادمة من دول الخليج العربي، كما أن المغرب يمتاز بمؤهلات كبيرة كموقعه الجغرافي واستقراره السياسي بالمقارنة مع المناخ السياسي والاقتصادي بعد الربيع العربي الذي ميز دول المغرب العربي.

في ظرفية اقتصادية صعبة تتميز بمعدل نمو متدن (2,9% سنة 2012 مقارنة مع4,9% سنة 2011) تعد الحاجة للاستثمار أكثر إلحاحا مقارنة مع ندرة السيولة. لهذا يجب على الحكومة المغربية العمل على جلب استثمارات أكثر لتسريع وتيرة النمو الاقتصادي وتحسين مستوى المؤشرات السوسيواقتصادية.

بصفة عامة النسيج الاقتصادي الوطني في حاجة ماسة للنهوض بالاستثمار، في هذا الإطار يمكن للصكوك الإسلامية أن تقدم حلولا ناجحة كبدائل مهمة بإمكانها الاستجابة لحاجة مختلف الفاعلين الاقتصاديين[8]. كالدولة والمقاولات الصغرى والمتوسطة المقاولات الكبرى المسجلة بالبورصة وغيرها وكذلك الأبناك وشركات التأمين.

4 خلاصة

هل بإمكان مدينة الدار البيضاء أن تشكل قطبا ماليا مهما في منطقة شمال افريقيا ؟ في إطار المنافسة الأوربية والإفريقية التي تشتد أكثر فأكثر ، كيف تتهيئ مدينة الدار البيضاء باعتبارها قطبا ماليا مهما في المغرب لتستقبل المصارف الإسلامية ؟ باعتبار موقعه الجغرافي واستقراره السياسي والمالي ومؤهلاته التنموية يمكن للمغرب وبالخصوص مدينة الدار البيضاء أن تشكل قطبا ماليا مهما في شمال افريقيا [9].

حسب دراسة أنجزتها شبكة رويترز في شتنبر 2012 بعدة دول الشرق الأوسط ودول جنوب شرق آسيا يتجه المستثمرون إلى الدول الصاعدة التي تعتمد التمويل الإسلامي كمصر، سلطنة عمان وكزخستان وقد صنف المغرب في مرتبة متقدمة من حيث أفضل البلدان (27%) التي تجلب الاستثمارات الأجنبية بحيث سبقت تونس ليبيا وكزخستان.

ويعد انفتاح المغرب على العالم وكذلك نهجه للاقتصاد الحر دوافع لجعله مركز للاستثمارات والمبادلات مما يفسر تنامي حاجة المغرب للاستثمارات في السنوات القادمة. لهذا يمكن للصكوك أن تلعب دورا كبيرا في تحقيق المشاريع التنموية : مشاريع البنية التحتية، الطاقات المتجددة، السياحة، التجارة ... هذا النوع الجديد من التمويل يمكن أن يروق عدد من المستثمرين الجدد ويجلب رؤوس أموال جديدة للمملكة[10].

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Conception d'un canal sous pression de forme triangulaire plein

[Design of pressurized full triangular shaped channel]

Lamri Ahmed Amine

Départment of civil engineering and hydraulic,
University of Mohamed khaydar Biskra,
Biskra, Algeria

ABSTRACT: In this work we present the design of the pressurized full triangular channel used frequently as drainage, culverts and storm drain. We use the universal equations of uniform turbulent flow, Darcy-Weisbach, Coolebrok-White and Reynolds number, we base on the referential model method to find a new and direct formulas for the calculation of the non dimensional normal depth and the linear dimension of the channel for value of Reynolds number higher than two thousand three hundred.

KEYWORDS: aspect ratio, uniform flow, discharge, explicit solution, energy slope.

RÉSUMÉ: Dans ce travail on présente la conception du canal sous pression de forme triangulaire plein fréquemment utilisé dans le drainage, les ponceux et collecteur d'eaux pluviales. On utilise les équations universelles de l'écoulement turbulent uniforme, Darcy-Weisbach, Coolebrok-White et le nombre de Reynolds. On se base sur la méthode du modèle rugueux de référence on trouve des nouvelles formules direct pour le calcul du rapport d'aspect et de la dimension linéaire pour les valeurs de nombre de Reynolds supérieur à deux mille trois cent.

MOTS-CLEFS: rapport d'aspect, écoulement uniforme, débit, solution explicite, pente longitudinale.

1 INTRODUCTION

Le modèle rugueux de référence que nous considérons est en fait un canal de forme triangulaire plein [1], [2], [3], caractérisé par une largeur de base $\overline{b}$, une rugosité absolue $\overline{\varepsilon}$, écoulant un débit volume $\overline{Q}$ d'un liquide de viscosité cinématique $\overline{v}$, sous une pente longitudinal $\overline{i}$. Le nombre de Reynolds caractérisant l'écoulement est $\overline{R}$ et le coefficient de frottement est $\overline{f}$ [7].

On affecte à ce canal une forte rugosité relative, arbitrairement choisie égale à $\overline{\varepsilon}/\overline{D_h} = 3.7 \times 10^{-2}$, de telle sorte que l'écoulement qui s'y produit soit en régime turbulent rugueux ou soit supposé être comme tel. La rugosité relative arbitrairement choisie $\overline{\varepsilon}/\overline{D_h} = 3.7 \times 10^{-2}$ est obtenue pour divers valeurs de la rugosité absolue $\overline{\varepsilon}$ et du diamètre hydraulique $\overline{D_h}$. Puisque l'écoulement est ou supposé être en régime turbulent rugueux [6], le coefficient de frottement $\overline{f}$ est donc régi par la relation de Nikuradse pour $\varepsilon/D_h = \overline{\varepsilon}/\overline{D_h}$ et $f = \overline{f}$, soit

---

$$\overline{f} = \left[-2\log\left(\frac{3{,}7.10^{-2}}{3.7} \right) \right]^{-2} = (4)^{-2} = 1/16$$

On développe ces paramètres dans les relations de Darcy-Wesbach, Coolebrok-White et le nombre de Reynolds [4], [5], en calcul le rapport d'aspect et la dimension linéaire du canal à partir des formules explicites et simplifiés.

2   CARACTÉRISTIQUES GÉOMÉTRIQUES ET HYDRAULIQUES DU CANAL

Figure1. est un schéma représentatif du canal de forme triangulaire plein il est composé d'un rectangle et d'un triangle rectangle incliné par un angle de 45°. Elle est caractérisé par sa largeur *b* et sa hauteur Y.
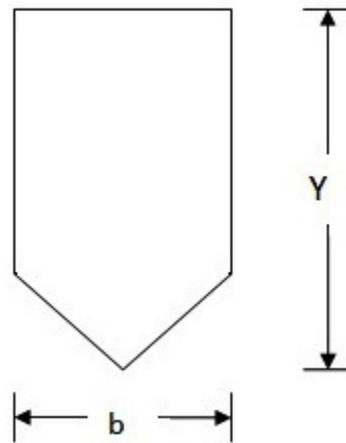
Fig. 1.   Caractéristique du canal de forme triangulaire plein

Notons que η=*Y /b est* le rapport d'aspect, et la section mouillé *A* s'exprime:

$$A = b^2\left(\eta - 1/4\right) \tag{1}$$

Le périmètre mouillé *P peut s'écrire*:

$$P = 2b(\eta + 1/\sqrt{2}) \tag{2}$$

Le diamètre hydraulique $D_h = 4\dfrac{A}{P}$: $\tag{3}$

$$D_h = \frac{b(2\eta - 1/2)}{\left(\eta + 1/\sqrt{2}\right)} \tag{4}$$

La perte de charges *i* est donnée par la relation de Darcy-Weisbach:

$$i = \frac{f}{D_h}\frac{Q^2}{2gA^2} \tag{5}$$

Ou *Q* est le débit, *g* est l'accélération de la pesanteur et *f* est le coefficient de frottement donné par la formule Colebrook-White :

$$\frac{1}{\sqrt{f}} = -2\log\left(\frac{\varepsilon / D_h}{3,7} + \frac{2,51}{R\sqrt{f}} \right) \tag{6}$$

ε est la rugosité absolue et *R* est le nombre de Reynolds:

$$R = \frac{4Q}{P\nu}$$ (7)

Ou ν est la viscosité cinématique.

3 MODÈLE RUGUEUX DE RÉFÉRENCE

La rugosité relative arbitrairement choisie $\overline{\varepsilon}/\overline{D_h} = 3,7.10^{-2}$ est obtenue pour diverses valeurs de la rugosité absolue $\overline{\varepsilon}$ et du diamètre hydraulique $\overline{D_h}$.

Puisque l'écoulement est ou supposé être en régime turbulent rugueux, le coefficient de frottement $\overline{f}$ est donc régi par la relation de *Nikuradse* pour $\varepsilon/D_h = \overline{\varepsilon}/\overline{D_h}$ et $f = \overline{f}$, soit $\overline{f} = \left[-2\log\left(\frac{3,7.10^{-2}}{3,7}\right)\right]^{-2} = \left(4\right)^{-2} = \frac{1}{16}$

Pour les caractéristiques hydraulique et géométriques du modèle rugueux de référence mentionnés par le symbole " $\overline{}$ ". Appliquant sur (5) on trouve :

$$\bar{i} = \frac{\overline{f}}{\overline{D_h}} \frac{\overline{Q}^2}{2g\overline{A}^2}$$ (8)

L'équation (8) devient:

$$\bar{i} = \frac{1}{128g} \frac{\overline{P}}{\overline{A}^3} \overline{Q}^2$$ (9)

Introduisant (1) et (2) a (9), en peut écrire :

$$\bar{i} = \frac{(\overline{\eta} + 1/\sqrt{2})}{64(\overline{\eta} - 1/4)^3}\left(\frac{\overline{Q}^2}{g\overline{b}^5}\right)$$ (10)

Posons que $\overline{Q} = Q$, $\bar{i} = i$, $\overline{D} = D$, $\overline{Y} \neq Y$ et $\overline{\eta} \neq \eta$. En peux déduire de (10):

$$b = \left[\frac{(\overline{\eta} + 1/\sqrt{2})}{64(\overline{\eta} - 1/4)^3}\right]^{1/5}\left(\frac{Q^2}{gi}\right)^{1/5}$$ (11)

Introduisons la conductivité relative $\overline{Q_b}^* = Q_b^* = \dfrac{Q}{\sqrt{gi\overline{b}^5}}$, (11) devient:

$$\frac{(\overline{\eta} + 1/\sqrt{2})}{64(\overline{\eta} - 1/4)^3} Q_b^{*2} = 1$$ (12)

Adoptons le changement de variables

$$\chi = \overline{\eta} - 1/4$$ (13)

L'équation 12 se réduit à :

$$\chi^3 - \frac{Q_b^{*2}}{64}\chi - \frac{(1/4 + 1/\sqrt{2})}{64}Q_b^{*2} = 0$$ (14)

L'equation14 est une équation cubique sans seconde ordre. Son discriminant est:

$$\Delta = 3\left(\frac{Q_b^*}{48\sqrt{2}}\right)^4 \left[(1/4 + 1/\sqrt{2})12\sqrt{3} - Q_b^* \left[(1/4 + 1/\sqrt{2})12\sqrt{3} + Q_b^*\right]\right]$$ (15)

L'équation 15 montre deux cas de solution :

1. $Q_b^* \leq (1/4 + 1/\sqrt{2})12\sqrt{3}$, donc $\Delta \geq 0$

$$\chi = \frac{Q_b^*}{4\sqrt{3}} ch(\beta/3)$$ (16)

Remplaçons dans (13), le rapport d'aspect $\overline{\eta}$ du modèle rugueux s'exprime:

$$\overline{\eta} = \frac{Q_b^*}{4\sqrt{3}} ch(\beta/3) + \frac{1}{4}$$ (17)

Ou l'angle β est :

$$ch(\beta) = \frac{(1/4 + 1/\sqrt{2})12\sqrt{3}}{Q_b^*}$$ (18)

2. $Q_b^* \geq (1/4 + 1/\sqrt{2})12\sqrt{3}$, donc $\Delta \leq 0$.

$$\chi = \frac{Q_D^*}{4\sqrt{3}} \cos(\beta/3)$$ (19)

Remplaçons dans (13), le rapport d'aspect $\overline{\eta}$ du modèle rugueux s'exprime:

$$\overline{\eta} = \frac{Q_b^*}{4\sqrt{3}} \cos(\beta/3) + \frac{1}{4}$$ (20)

Ou l'angle β est égale à :

$$\cos(\beta) = \frac{(1/4 + 1/\sqrt{2})12\sqrt{3}}{Q_b^*}$$ (21)

4   FACTEUR DE CORRECTION POUR LA DIMENSION LINEAIRE

Selon la méthode du modèle rugueux, toute dimension linéaire b d'un canal donné est égale à la dimension linéaire homologue $\overline{b}$ du modèle rugueux, corrigée par les effets d'un facteur de correction ψ. Cela se traduit par la relation :

$$b = \psi \overline{b}$$ (22)

Où Ψ est le facteur de correction de la dimension linéaire, pouvait s'écrire sous la forme:

$$\psi \cong 1,35 \left[-\log\left(\frac{\varepsilon/\overline{D_h}}{4,75} + \frac{8,5}{\overline{R}}\right) \right]^{-2/5}$$ (23)

5 ETAPES DE CALCUL DE LA DIMENSION LINÉAIRE Y

Connaissons le débit *Q*, la largeur du canal *b*, la perte des charge *i*, la rugosité absolue ε et la viscosité cinématique v, les étapes suivantes sont recommandé pour calculer la dimension linéaire Y:

1. calcul de la conductivité relative $Q_b^* = \dfrac{Q}{\sqrt{gi\overline{b}^5}}$ pour $\overline{b} = b$.

2. Calcul du rapport d'aspect $\overline{\eta}$ utilisant (17) et (18) en accordance avec le signe du discriminant Δ.

3. Connaissons *b* and $\overline{\eta}$, calcul du périmètre mouillé $\overline{P}$, le diamètre hydraulique $\overline{D}_h$ et le nombre de Reynolds $\overline{R}$ utilisons (2), (4) et (7) respectivement.

4. A partir de (23), on calcul le facteur de correction Ψ.

5. Assigner au modèle rugueux la dimension linéaire $\overline{b} = b/\psi$ d'après (22).

6. Calcul de la nouvelle valeur de la conductivité relative $\overline{Q_b}^* = Q/\sqrt{gi\overline{b}^5}$

7. Appliquons donc (17) ou (18), en accordance avec le signe du discriminant Δ, résultat sur $\overline{\eta} = \eta$.

8. La valeur requise de la hauteur de la conduite *Y* est finalement $Y = b\eta$.

6 EXEMPLE

Calculer la hauteur du canal triangulaire plein en charge pour les données suivantes :

Q =3m³/ s, *b* =1.5m, *i* =0.0006, ε=0.0015m, v=0.000001m²/ s

1. Pour $\overline{b} = b$, la conductivité relative $Q_b^* = \dfrac{Q}{\sqrt{gib^5}}$ est :

$$Q_b^* = \frac{Q}{\sqrt{gib^5}} = \frac{3}{\sqrt{9.81 \times 4 \times 10^{-4} \times 1.5^5}} = 14{,}19001904$$

2. $Q_b^* \leq (1/4 + 1/\sqrt{2})12\sqrt{3}$ le discriminant Δ est positive :

$$ch(\beta) = \frac{(1/4 + 1/\sqrt{2})12\sqrt{3}}{\overline{Q_b}^*} = \frac{19.89309089}{14,19001904} = 1{,}40190727$$

$\beta = 0{,}86895863$ Radian

$$\overline{\eta} = \frac{\overline{Q_b}^*}{4\sqrt{3}} ch(\beta/3) + \frac{1}{4} = 2{,}38467399$$

3. D'après (2), (4) et (7) on calcul:

$$\overline{D}_h = \frac{b(2\overline{\eta} - 1/2)}{(\overline{\eta} + 1/\sqrt{2})} = 2{,}15216487$$

$$\overline{P} = 2\overline{b}(\overline{\eta} + 1/\sqrt{2}) = 2b(\overline{\eta} + 1/\sqrt{2}) = 9{,}27534231$$

$$\overline{R} = \frac{4Q}{\overline{P}\nu} = \frac{4 \times 3}{9,27534231 \times 10^{-6}} = 1293752,79$$

4. D'après (23) en trouve :

$$\psi = 1.35\left[-\log\left(\frac{0.0015/2,15216487}{4.75} + \frac{8.5}{1293752,79}\right)\right]^{-2/5} = 0,79024323$$

5. $\overline{b} = \dfrac{b}{\psi} = \dfrac{1.5}{0,79024323} = 1,89814976\,m$

6. La nouvelle valeur de la conductivité relative est:

$$\overline{Q_b}^* = Q/\sqrt{gi\overline{b}^5} = 4/\sqrt{9.81 \times 4 \times 10^{-4} \times 1,89814976^5} = 7,877437$$

7. $Q_b^* \leq (1/4 + 1/\sqrt{2})12\sqrt{3}$, donc $\Delta \geq 0$:

$$ch(\beta) = \frac{(1/4 + 1/\sqrt{2})12\sqrt{3}}{\overline{Q_b}^*} = \frac{19.89309089}{7,877437} = 2,52532529$$

$\beta = 1,57778603$ Radian

$$\eta = \overline{\eta} = \frac{\overline{Q_b}^*}{4\sqrt{3}}ch(\beta/3) + \frac{1}{4} = 1,54791733$$

8. Finalement, la valeur requise de la dimension linéaire est:

$$Y = b \times \eta = 1.5 \times 1,54791733 = 2,32187599\,m$$

7 CONCLUSION

On a appliqué la méthode du modèle rugueux sur le canal de forme triangulaire plein. L'objective été de calculer le rapport d'aspect et la hauteur du canal. La conductivité relative et le rapport d'aspect été relié par une relation cubique, elle a été résolue analytiquement. Les étapes de calcul sont explicites et simples.

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Enquêtes ethnomellisologiques et étude des différents produits de la ruche de l'ile d'Idjwi (Sud-Kivu/RD Congo)

Patrick Habakaramo Macumu[1-2], Ntahobavuka Habimana Honorine[3], and Chantal Kabonyi Nzabandora[4]

[1]Observatoire Volcanologique de Goma, Département de Géochimie et Environnement, RD Congo

[2]Institut Supérieur Pédagoque d'Idjwi, RD Congo

[3]Université de Kisangani, Facultés des Sciences, Département de Biologie, RD Congo

[4]Université Officielle de Bukavu, Département de Biologie, RD Congo

ABSTRACT: This study presents the results of a study on the inventory of honey plants and various bee products known to beekeepers Idjwi island in the South Kivu province in the Democratic Republic of Congo. To obtain reliable results we used three methods including surveys, observations and crops. This allowed us to find 111 species of woody plants alone account for 62 species or 55.86%. Liquid honey (Buki), the coaguleux honey (Sinde) and wax (Bishoko) are the three types of bee products known to beekeepers Idjwi. Honey is a basic element in the nutrition and health for island Idjwi.

KEYWORDS: ethnomellisologiques surveys, bee plants, honey, bees, hive, phanerophytes, geophytes.

RESUME: Cette étude présente les résultats d'une étude sur l'inventaire des plantes mellifères et des différents produits de la ruche connus par les apiculteurs de l'ile d'Idjwi dans la province du Sud-Kivu en République Démocratique du Congo. Pour obtenir des résultats fiables nous avons recouru à trois méthodes dont les enquêtes, les observations et les récoltes. Ce qui nous a permis de trouver 111 espèces dont les plantes ligneuses représentent à elles seules 62 espèces, soit 55,86%. Le miel liquide (Buki), le miel coaguleux (Sinde) et la cire (Bishoko) sont les trois types des produits de la ruche connus par les apiculteurs à Idjwi. Le miel est donc un élément de base dans la nutrition et la santé pour les insulaires d'Idjwi.

MOTS-CLES: Enquêtes ethnomellisologiques, Plantes mellifères, miel, abeilles, ruche, Phanérophytes, Géophytes.

1 INTRODUCTION

L'ile d'Idjwi, la plus grande de la République Démocratique du Congo, regorgeait jadis une flore riche en espèces tant végétales qu'animales (Kabonyi, 2004).

Selon HERI KAZI (1997), la végétation de cette ile était formée des brousses avec des bambous rabougris, de surfaces boisées des *Eucalyptus, Grevillea, Cupressus* aménagés par les colons Belges. Cette végétation est en pleine disparition avec la forte croissance démographique qui s'observe.

Cette ile logeait un grand massif forestier, qui est la foret de Nyamusisi avec les essences caractéristiques : *Symphonia globulifera, Macaranga monandra, Harungana arborea, Harungana montana et Parinari excelsa.* Kabonyi (Op.cit.)*.

Avant la dégradation de cette forêt, les apiculteurs produisaient une quantité énorme des miels grâce à une floraison abondante.

Depuis 1995, on assiste à la destruction de la forêt de Nyamusisi par les réfugiés rwandais qui se sont installés sur l'ile fouillant la guerre dans leur pays. Cette destruction s'est accentuée par la population locale à la recherche champs des cultures, bois de chauffe, charbon et des matières premières (cassitérites et coltans). Avec cette situation, l'apiculture a perdu sa valeur avec un taux de productivité trop faible des miels.

Une attention particulière doit être accordée à des ilots forestiers et surfaces boisés de l'ile afin d'inventorier les différentes espèces peuplant la région dans le but de proposer des mesures de conservation et de valorisation de son couvert végétal et de son biotope.

L'apiculteur étant à la recherche des plantes mellifères ne peut en aucun cas se passer de la végétation forestière et des surfaces boisées des contrées qu'il habite. Ce travail vise à recenser les différents biotopes se trouvant à Idjwi susceptibles d'abriter les ruches et d'inventorier les espèces végétales butinées par les abeilles. Il dresse donc un catalogue des plantes mellifères d'Idjwi selon une classification botanique définie, propose des mesures de protection de ces plantes, relève l'importance des produits apicoles. Bref, c'est un outil de référence pour les futurs chercheurs qui pourront se lancer dans ce domaine.

2 MILIEU D'ÉTUDES

L'île d'Idjwi se situe à l'Est de la R.D.Congo en Province du Sud-Kivu et couvre une superficie de 680km^2, soit 1/9 de toute l'étendue du lac Kivu dont 310km^2 des terres émergées et 370 km^2 des eaux territoriales (Balleiy, 1936).

Elle est située entre la latitude 1°59' et 2°28' Sud et la longitude 29°05' et 28°26' Est suivant l'allongement NNE-SSW dans la zone axiale du lac Kivu.

Elle est limitée au Nord par la province du Nord Kivu, au Sud et à l'Est par la République Rwandaise, à l'Ouest par les territoires de Kabare et Kalehe. Quant à la subdivision administrative, elle comprend deux chefferies dont celle de Ntambuka au Sud et celle de Rubenga au Nord.

3 MATÉRIELS ET MÉTHODES

Pour réaliser ce travail, les matériels suivants ont été utilisés :

- un sécateur pour sectionner les spécimens destinés à l'herbier,

- un cahier et un crayon pour l'enregistrement des données sur le terrain,

- des papiers journaux et des presses en bois étaient utilisés pour le pressage et le séchage des spécimens d'herbier

- différents bocaux pour la récolte des échantillons des miels, pour pouvoir les apprécier selon la couleur et la consistance. Les espèces inconnues ont été amenées à l'herbarium du Centre de Recherche en Sciences Naturelles de Lwiro.

Trois méthodes d'études ont été utilisés sur terrain: les enquêtes ethnomellisologiques, les observations et les récoltes.

a) Enquêtes Ethnomellisologiques : consistent à des conversations semi structurées avec les apiculteurs de toute la contrée d'étude. Différentes questions ont été préparées à l'avance, d'autres apparaissent durant la conversation suivant les réactions des enquêtés. Des questions étaient en rapport avec :

- la végétation et surtout les plantes butinées par les abeilles, l'emplacement des ruches, la production et la période de récolte des miels, la quantité de miels produits par ruche, les usages locaux des miels etc.

b) les observations : Cette étude s'est effectuée pendant une période de 9 mois soit du Janvier à Octobre 2007. Les sites d'études étaient essentiellement constitués des forets reliques ou ilots forestiers, des champs de cultures, des jardins familiaux et des buissons. Nous avons observé trois fois par semaine le matin de 8h30' à 12h^{00} et le soir de 16h^{00} à 17h30' les mouvements des abeilles et les plantes fleuries qu'elles fréquentaient. Ce temps correspond à la période d'activités journalières des abeilles.

Les observations se faisaient également au niveau des ruches. A chaque observation un inventaire des plantes était effectué et à chaque espèce est affecté son type morphologique, type biologique, type de biotope, type de distribution phytogéographique, la couleur des fleurs et la partie butinée par l'abeille.

c) la récolte : Deux types des récoltes ont été effectuées ; la récolte des produits de la ruche (miel, cire, gelée royale) et la récolte des spécimens d'herbier. Les miels ont été récoltés par ruche et apprécier selon le goût, la couleur, la consistance.

Selon Emmanuel (2008), le miel est la denrée produite par les abeilles mellifiques à partir du nectar des fleurs ou des sécrétions provenant des parties vivantes des plantes ou se trouvant sur elles, qu'elles butinent, transforment, combinent avec des matières spécifiques propres et laissent murir dans les rayons de la ruche. Cette denrée peut être fluide, liquide ou cristallisé.

La FAO, (1993) classe le miel comme un produit forestier non ligneux. Le miel est un aliment naturel depuis 700 ans avant J.C ; il est la seul source de sucre des populations indigènes les plus retirées des forêts tropicales.

Le miel a une composition moyenne de : 79,5% d'hydrates de carbone, 17% d'eau et 3,5% des matières diverses (LEEN VAN'T LEVEN, 2005).

4 RESULTATS

4.1 INVENTAIRE FLORISTIQUE DES ESPECES MELLIFERES DU TERRITOIRE INSULAIRE D'IDJWI

a) Liste floristique

Le tableau I, présente les espèces des plantes butinées par les abeilles pour la production du miel, chacune étant affectée de son type morphologique (TM), type biologique (TB), type d'habitat (TH), la couleur de la fleur (FLE) et la substance récoltée par l'abeille (nectar ou pollen).

N°	Familles et espèces	TM	TB	HAB	NECT	POL	FLE
	ACANTHACEAE						
1	*Acanthus pubescens* (Thomson ex Oliv.) Engl.	S-arb	Mcph	JaH	+	+	Bv
2	*Asystasia gangetica* (L.)T.Anders	Han	Chgr	Rud	+	+	B
3	*Brillantaisia cicatricosa* Lindau	S-arb	Cher	JaA	+	+	Rs
4	*Hygrophila auriculata* (Schumach.) Hien	Suff	Nph	jaH	+	+	Bl
5	*Justicia flava* (Hochst. Ex Nees) T. Anders	Han	Chgr	jaH	+	+	B
	AMARANTHACEAE						
6	*Amaranthus* viridis L.	Han	Tsc	Cult	-		Jv
7	*Amaranthus hybridus* L.	Han	Tsc	Cult	-	+	Jv
8	*Amaranthus gracilis* L.	Han	Tsc	Cult	-	+	Jv
	ANACARDIACEAE						
9	*Mangifera indica* L.	A	Mcph	Cult	+		Cr
	ASTERACEAE						
10	*Ageratum conysoides* L.	Han	Tsc	JaH	+		Bp
11	*Bidens pilosa* L.	Han	Tsc	JaH	+	+	Bj
12	*Bothriocline longipes* Oliv & Hien.	Suff	Nph	JaH	+	+	Bp
13	*Crassocephalum mannii* Hook.f.	Arb	Tsc	JaH	+	+	J
14	*Crassocephalum vitellinum* (Benth) S.Moore	Han	Tsc	JaH	+	+	J
15	*Galinsoga parviflora* Cav.	Han	Tsc	JaH	+	+	Bj
16	*Galinsoga ciliata* Cav.	Han	Tsc	JaH	+	+	Bj
17	*Guizotia scabra* (vis.) Chiov.	Han	Nph	JaA	+	+	J
18	*Gynura scandens* S. Moore	Suff	Tsc	Rud	+	+	J
19	*Helianthus annuus* L.	Han	Tsc	Cult	+	+	J
20	*Melanthera scandens* (Schumatch.& Thonn.)	Suff	Tsc	Rud	+	+	J
21	*Microglossa pyrifolia* (Lam.)O. Kuntze	Han	Tsc	JaA	+	+	Bg.
22	*Mikania cordata* (Burm) Bf.L. Robinson	Han	Tgr	JaA	+	+	Bl
23	*Senecio stuhlmanii* klatt	arb	Tsc	Rud	+	+	Bl
24	*Tagetes minuta* L.	Suff	Tsc	Cut	+	+	J
25	*Taraxacum officinale* L.	Han	Tsc	Cut	+	+	J
26	*Tittonia diversifolia* A.GRAY	S-arb	Nph	Rud	+		J
27	*Vernonia amygdalina* Del.	Han	Mcph	Rud	+		Bg
28	*Vernonia kirungae* R.E. Fries	Han	Mcph	JaA	+	+	Bg
29	*Zinnia elegans* JACQ	Han	Tsc	Cult	+	+	Rs

	BIGNONIACEAE						
30	*Jacaranda mimosifolia* Don.	A	Mcph	Cult	+		J
31	*Markhamia lutea* (seem.) K.Schum.	A	Mcph	Cult	+	+	Ro
32	*Spathodea campanulata* P.Beav.	A	Mcph	Cult	+	+	J
	BRASSICACEAE						
33	*Brassia oleracea* L.	Han	Tsc	Cult	+		J
34	*Erucastrum arabicum* Fisher & Meyer	Han	Tsc	JaH		+	J
	CANNACEAE						
35	*Canna indica* L.	Hvi	Grh	Cult	+		Bg
36	*Canna grandiflora* L.	Hvi	Grh	Cult	+	+	Be
	CARICACEAE						
37	*Carica papaya* L.	arb	Mcph	Cult	+		Bv
	COMMELINACEAE						
38	*Commelina benghalensis* L.	Hvi	Tgc	Rud	+		Bv
	CONVOLVULALECEAE						
39	*Ipomoea batatas* Poir	Hvi	Grh	Cult	+		J
40	*Ipomoea involucrata* P.Beauv.	Lian	Grh	Cult	+	-	J
	CUCURBITACEAE						
41	*Cucurbita pepo* L.	Han	Tgr	Cult	+		Ro
42	*Cucubita maxima* L.	Han	Tgr	Cult	+	+	B
	EUPHORBIACEAE						
43	*Euphorbia pulcherima* Wild.	S-arb	Nph	Cult	+		Ro
44	*Manihot esculenta* CRANTZ.	S-arb	Nph	Cult	+	+	J
45	*Ricinus communis* L.	S-arb	Nph	Rud	+	+	J
	FABACEAE						
46	*Arachis hypogaea* L.	Han	Tsc	Cult	+		J
47	*Albizia adiantifolia* (Shumach.)	A	Msph	Fo	+	+	J
48	*Albizia gummifera* (J.F.) GMELIN	A	Msph	Fo	+	+	J
49	*Caesalpinia decapetala* (Roth) Alston	Suff	Nph	Cult	+	+	J
50	*Cassia floribunda* Cav.	Suff	Nph	JaA	+	+	J
51	*Cassia hirsuta* L	Suff	Nph	JaA	+	+	J
52	*Cassia mimosoides* L.	Han	Nph	JaA	+	+	J
53	*Cassia occidentalis* L.	Han	Mcph	JaA	+	+	J
54	*Cenna spectabilis* DC.	A	Nph	JaA	+	+	J
55	*Cajanus cajan* (L.) Millsp.	S-arb	Nph	Cult	+	+	Ro
56	*Crotalaria spinosa* Hochst..ex Benth.	Han	Nph	Cult	+	+	Ro
57	*Desmodium repandum* (vahl) DC.	Suff	Nph	JaA	+	+	J
58	*Erythrina abyssinica* Lam. ex. DC.	arb	Mcph	JaA	+	+	J
59	*Leceuna glauca* Benth.	arb	Mcph	JaA	+	+	Rs
60	*Milletia dura* DUNN.	A	Mcph	Cult	+	+	Ro
61	*Phaseolus vulgaris* L.	Hvi	Tgr	JaA	+	+	B
62	*Pisum sativum* L.	Hvi	Tgr	Cult	+	+	J
63	*Tephrosia vogeli*i Hook.F.	S-arb	Nph	Cult	+	+	J
	HYPERICACEAE						
64	*Harungana madagascariensis* Lam. ex Poir.	S-arb	Nph	JaA	+		Be
65	*Harungana montana* Lam. ex Poir	A	Msph	Fos	+	+	J
	LAMIACEAE.						
66	*Hoslundia opposita* Vahl.	Suff	Nph	Rud	+		Vi
67	*Leonotis nepetaefolia* R.Br.	Suff	Nph	Rud	+	+	B
68	*Ocimum gratissimum* L.	Suff	Nph	JaA	+	+	Bg
69	*Plectranthus barbatus* Ander.	Suff	Nph	JaA	+	+	J
	LAURACEAE						
70	*Persea americana* Mill.	A	Nph	Cult	+		J

	MALVACEAE						
71	*Abutilon mauritianum*(Jacq) Medic.	S-arb	Nph	JaA	+		Ro
72	*Hibiscus rosa-sinensis* L.	S-arb	Nph	JaA	+	+	Rp
73	*Hibiscus sabdariffa* L.	S-arb	Nph	JaA	+	+	Ro
74	*Malvaviscus arboreus* Cav.	S-arb	Cher	JaA	+	+	J
75	*Urena lobata* L.	S-arb		Cult	+	+	Bg
	MUSACEAE						
76	*Musa nana* L.	Hvi	Gtu	Cult	+		Bg
77	*Musa parasidiaca* L.	Hvi	Gtu	Cult	+	+	Bg
78	*Musa sapientum* L.	Hvi	Gtu	Cult	+	+	Bg
79	*Musa sinensis* L.	Hvi	Gtu	Cult	+	+	Jp
	MYRTACEAE						
80	*Eucalyptus sp*	A	Msph	Cult	+		Ro
81	*Callistemon specious* Dc.	arb	Mcph	Cult	+	+	Ro
82	*Psidium guajava* L.	arb	Mcph	Cult	+	+	J
83	*Syzygium guineense* (Wild) DC.	A	Msph	Fos	+	+	J
	NYCTAGINACEAE						
84	*Mirabilis jalapa* L.	Han	Cher	Rud	+		J
	PASSIFLORACEAE						
85	*Passiflora edulis* SIMS	Lian	Phgr	Cult	+		Ro
	PHYTOLACCACEAE						
86	*Phytolacca dodecandra* L'hérit	Lian	Phgr	Rud	+		Bj
	POACEAE						
87	*Hyparrhenia diplandra* (HACK)Stape	Han	TCes	Cult	+	+	J
88	*Sorghum bicolor*(L.)Moench	Han	TCes	Cult	+	+	Bj
89	*Zea mays* L.	Han	TCes	Cult	+	+	Ro
	PROTEACEAE						
90	*Grevillea robusta* A.Cunn.	A	Msph	Cult	+		Bj
	POLYGONACEAE	Hvi	TCes	Rud	+		J
91	*Polygonum nepalens* Meissn	Hvi	TCes	Rud	+	+	Bg
92	*Polygonum bequaertii* De Wild	Hvi	TCes	Rud	+	+	Bj
93	*Rumex usambarensis* Dammer					+	
	RHAMNACEAE						
94	*Gouania longispicata* Engl.	Lian	Mcph	JaA	+		Bl
	RUTACEAE						
95	*Citrus limon* (L.)Burm.	arb	Mcph	Cult	+		Ro
96	*Citrus sinensis* OSBECK	arb	Mcph	Cult	+	+	Bg
	RUBIACEAE						
97	*Chassalia subocreata* ROBYNS	arb	Mcph	Fos	+		Bg
98	*Cinchona ladgeriana* Moens & Trime	arb	Mcph	Cult	+	+	Bg
99	*Coffea robusta* L.	arb	Mcph	Cult	+	+	Bl
100	*Coffea arabica* L.	arb	Mcph	Cult	+	+	Ro
101	*Galiniera saxifraga* L.	arb	Nph	Fos	+	+	Bl
	SOLANACEAE						
102	*Datura candida* PERS	S-arb	Mcph	Cult	+		Bl
103	*Datura suaveolens* PERS	S-arb	Mcph	Cult	+	+	Bl
104	*Datura stramonium* L.	S-arb	Mcph	Rud	+	+	Bl
105	Nicotiana tabacum L.	Han	Nph	Cult	+	+	Bl
106	Physalis *peruviana* L.	Han	Tsc	Rud	+	+	Bl
107	*Solanum indicum* L.	S-arb	Mcph	Rud	+	+	Bl
108	*Solanum americanum* L.	Han	Tsc	Cult	+	+	Bl
109	*Solanum tuberosum* L.	S-arb	Mcph	Cult	+	+	Bl
110	*Lycopersicon esculentum* (Mill.)Dunn.	Han	Tsc	Cult	+	+	Bl

				Rud			
111	*Tropaeolum majus* L.	Lian	Tgr	JaH	+	+	J

4.2 ANALYSE FLORISTIQUE

L'analyse floristique des plantes mellifères découle du tableau I. Les paramètres suivants sont analysés : types morphologiques, types de biotopes et types de distribution phytogéographiques.

a. Types Morphologiques (TM)

Les différents types morphologiques composant la flore mellifère de l'ile d'Idjwi sont présentés au tableau II et à la figure 1.

Tableau II : Distribution de types morphologiques de la flore mellifère de l'île d'Idjwi

Types morphologiques	Nombre d'espèces	Taux (%)
• **Plantes ligneuses**	**62**	**55,86**
- Arbres (A)	13	11,71
- Arbustes (arb)	16	14,42
- S-arbustes (s-arb)	20	18,02
- Suffrutex	13	11,71
• **Plantes herbacées**	**44**	**39,65**
- herbes vivaces (Hvi)	14	12,61
- herbes annuelles (Han)	30	27,02
• **Lianes**	**5**	**4,50**
Total	**111**	**100,00**
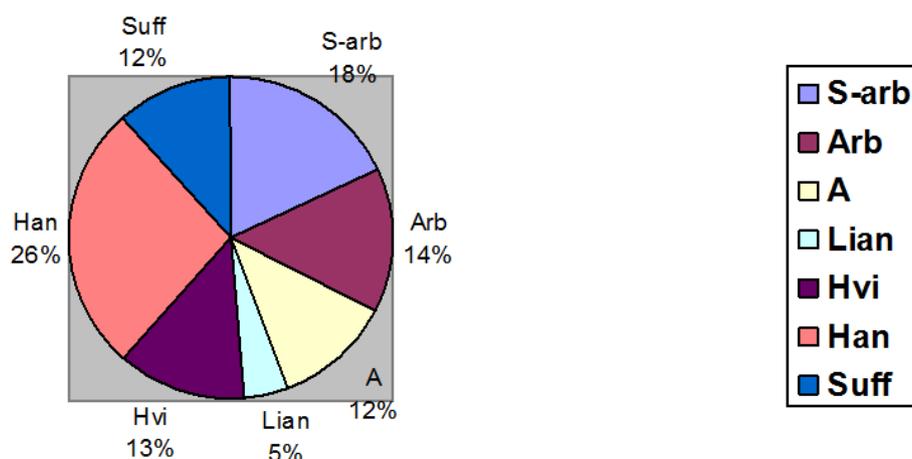
Figure 1 : Distribution des types morphologiques de plantes mellifères d'Idjwi.

Il convient de remarquer que les plantes ligneuses sont les plus abondantes avec 62 espèces, soit 55,86%. Ainsi, les sous arbustes avec 20 espèces, soit 18,02% occupent la première place, suivis des arbustes avec 16 espèces, soit 14,42%, et enfin des arbres et des suffrutex avec 13 espèces soit 11,71% chacun.

Quant aux plantes herbacées, elles représentent un taux de 39,64%, soit 44 espèces ; les herbes annuelles avec 30 espèces, soit 27,02% dominent sur les herbes vivaces qui n'ont que 14 espèces, soit 12,61%. Les lianes sont faiblement représentées avec 5 espèces, soit 4,50%.

b. Types Biologiques (TB)

Les différents types biologiques des plantes mellifères sont présentés au tableau III dont est extraite la figure 2.

Tableau III : Distribution des types biologiques des plantes mellifères de l'ile d'Idjwi.

Types biologiques	Nombre d'espèces	Taux (%)
- Phanérophytes	62	55,86
- Chaméphytes	5	4,50
- Thérophytes	36	32,44
- Géophytes	8	7,20
Total	**111**	**100,00**
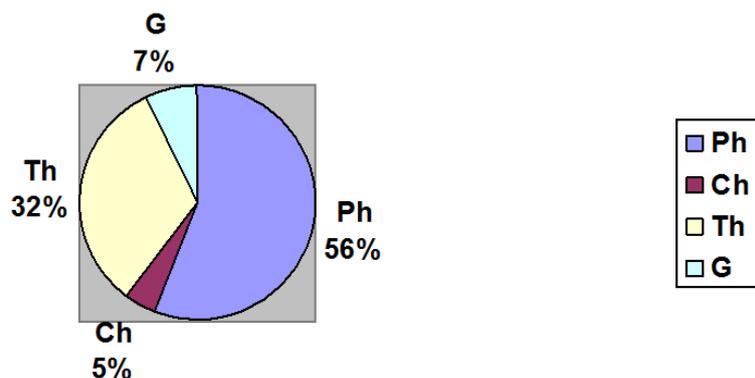
Figure 2: Distribution des types biologiques de la flore mellifère d'Idjwi.

Ces résultats confirment l'abondance des Phanérophytes avec 62 espèces, soit 55,86% par rapport aux autres types biologiques.

c. Types de Biotopes (TBi)

Les différents types de biotopes où croissent les plantes mellifères sont présentées au tableau IV et à la figure 3.

Tableau IV : Distribution des biotopes de la flore mellifères d'Idjwi.

Types des biotopes	Nombre d'espèces	Taux (%)
- Rudéral (Rud)	18	16,21
- Cultural (Cult)	51	46
- Jachère arbustive (JaA)	23	20,72
- Jachère herbacée(JaH)	13	11,71
- Forêt (Fo)	6	5,40
Total	**111**	**100**
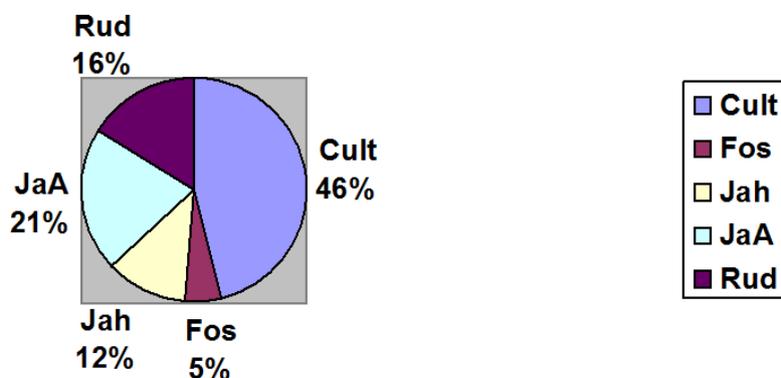
Figure 3 : Distribution des types de la flore mellifère d'Idjwi-Sud

Comme nous le remarquons à la figure 3 et au tableau 5 les plantes mellifères d'Idjwi sont majoritairement cultivées.

Elles sont les plus représentées avec un record de 51 espèces, soit 46%. Les plantes de jachère arbustive occupent la deuxième position avec 23 espèces, soit 20,72%, suivis des plantes rudérales avec 18 espèces, soit 16,21%, viennent ensuite les plantes de jachère herbacé avec 13 espèces, soit 11,71% et enfin les espèces de foret avec 6 espèces soit 5,40%.

5 DISCUSSION

Les ruches sont placées selon certaines stratégies en rapport avec le relief. Les montagnes, les champs de culture, les jachères, les plantations, les savanes étaient la cible des apiculteurs. Dans les îlots forestiers, il convient de signaler que les espèces *Harungana madagascariens, Harungana montana, Galiniera coffeoides et Chassilia subocreata* étaient dominantes et plus fréquentées, alors que dans les plantations aménagées, on signale la dominance des espèces *Cinchona ladgeriana, Coffea sp, Eucalyptus sp, Grevillea sp,* .

Par ailleurs dans les champs de culture, les ruches sont placées dans des champs à *Phaseolus vulgaris* et *Sorghum bicolor*.

Il faut noter que la récolte du miel correspond à la floraison des essences mellifères.

Une fois les abeilles habitent déjà la ruche, elles peuvent produire du miel au cours d'une période s'étalant entre 3 à 5 mois. Une fois dépassée cette période le miel peut être recueillie par les producteurs et la cire servira pour loger les larves de la ruche. Des larves grandissent, elles nourrissent d'autres jeunes abeilles sorties des alvéoles.

Les abeilles sont des insectes sociaux organisés en caste ou polymorphisme. Dans chaque ruche, on trouve :

- la Reine appelé Mwami en dialecte « Havu » : dans une famille d'abeille il y a seulement un roi qui constitue le fondement de la famille des abeilles.

C'est une abeille deux fois plus longue que les autres, son rôle fondamental est la ponte des larves. Celle-ci n'est pas agressive.

- des abeilles de grande taille et très noires ; leur rôle est d'apporter des matériaux de construction des rayons, de la cire et de la propolis. Elles sont appelées « Nyenzi » en dialecte « Havu » ; ce sont des Faux-bourdons.

- les petites abeilles, très agressives de couleur jaunâtre, elles sont appelées « Nyakajuki » en langue vernaculaire : ce sont les ouvrières, elles sont les plus nombreuses dans le troupeau d'abeilles. Elles récoltent le nectar et pollen pour la fabrication du miel.

Une fois la ruche devient incapable de supporter toute la colonie d'abeilles suite à leur nombre élevé, la colonie se scinde en deux de façon mutuelle : c'est l'essaim. La famille se démultiplie donc non seulement quand il y a trop d'abeilles mais aussi quand il y a beaucoup de miel dans une ruche ou à la mort d'une reine. C'est donc une séparation amicale.

Le miel est un produit sucré fabriqué par les abeilles grâce à diverses substances récoltées sur des plantes et des endroits souillés. Dans une ruche les produits suivants ont été distingués sur le terrain à Idjwi :

- Le miel liquide appelé « Buki » : c'est le meilleur produit fabriqué par les abeilles. C'est le miel qui est consommé par une multitude des personnes, il est mis en boîte et vendu sur le marché. Il se conserve pendant longtemps. C'est un miel de meilleure qualité.

- Le miel coagulé appelé « Sinde » : c'est un produit de couleur jaunâtre. Il est préparé avec de l'huile et mangé par la population locale. Ce genre de miel ne se conserve pas pendant longtemps et ne se vends pas.

- La cire appelée « Bishoko » : c'est la plaquette dans laquelle l'abeille garde tous les fruits de ses récoltes et dans laquelle naissent les larves. La cire est bien connue à Idjwi. L'apiculteur sait qu'elle sert à la fabrication des bougies bien que celui-ci n'a pas un équipement adéquat pour cette fin.

La récolte des miels se fait actuellement deux fois par an : durant la saison sèche au mois de Juin, de Juillet, Août et pendant la saison de pluie en Février et Mars. La récolte se fait d'une manière traditionnelle car les apicultures n'ont pas des matériels nécessaires pour cette pratique. Ils utilisent un trousseau d'herbes (Fumba) contenant du feu qui joue le rôle de la pompe à fumée (enfumoir). Son rôle est d'amener les abeilles à se diriger vers la partie inférieure de la ruche et non pas les chasser de la ruche. Un bassin ou une casserole sert à garder le miel récolté.

A Idjwi le miel est utilisé pour diverses raisons: Alimentation humaine, mélange avec certaines boissons locales pour améliorer la qualité, traitement des maladies (plaies buccales chez les enfants, bronchite, maladies d'estomac, cardiaque, hépatique, tuberculose, toux, verminose, hémorragie, angines, etc.), il est sources des revenues.

Les apiculteurs d'Idjwi sont exposés aux piqûres des abeilles car ils n'ont pas des matériels propres à cette pratique : pas des casques, pas des gants ni de pompe à fumée.

Comme la forêt de Nyamusisi a été complètement détruite et que les espaces boisées sont menacés ; les abeilles d'Idjwi risquent de fuir pour une autre région où le couvert végétal est encore existant.

Ainsi par manque des forêts, certains apiculteurs sont contraints de placer les ruches dans des propriétés privées en se fixant des conditions de louages de ces biotopes. Avant la destruction de Nyamusisi, un apiculteur produisait 10 litres des miels par ruche. Actuellement l'apiculteur produit 2 à 4 litres suite à la destruction des forêts.

Dans le présent travail nous avons trouvé que les abeilles visitent en majorité les essences cultivées notamment : *Eucalyptus globulis, Mangifera indica, Persea americana, Grevillea robusta, Helianthus annuus, Cinchona ladgeriana, Phaseolus vulgaris* et les essences de la forêt secondaire comme *Harungana montana, Harungana madagascariensis, Galiniera coffeoides, Chassalia subocreata,...* Par contre dans la région de Kahemba, DUBOIS et COLLART (Op.cit), ont montré que ce sont principalement les essences de la forêt sèche à *Berlinia* et à *Brachystegia* qui sont plus fréquentées par les abeilles. Ils ont prouvé que les plantes herbacées et certaines plantes suffrutescentes des sous bois produisent également du nectar et du pollen. Ces résultats coïncident avec les nôtres car à Idjwi en plus des plantes ligneuses (arbres, arbustes, lianes) il y a aussi des nombreuses plantes herbacées qui sont visitées par les hyménoptères. Ces mêmes auteurs ont essayé d'établir la liste floristique des plantes mellifères. Parmi ces espèces, nous citons: *Isoberlinia Baumii ,* Syn : *Brachystegia mellifera, Brachystegia spicoeformis,* syn : *B. wangermeeana, Cyptoscpalum fructiocosum,Cyptosssepalum pseudotaxus.*

Ces quatre espèces sont les plus importantes de la région de Kahemba non seulement par leurs fleurs mais aussi par ce que leurs écorces entrent dans la fabrication des ruches.

A Idjwi les habitants estiment que les miels issus des essences : *Cinchona ladgeriana, Pesea Americana, Mangifera indica, Harungana montana, H. madagascariensis,...* sont plus appréciées par la population locale car ces essences procurent aux miels les vertus thérapeutiques. Les autres essences comme *Macaranga monandra, Pennissetum* et *Elaeis guineensis* sont utilisés pour la fabrication des ruches. Nos résultats et ceux des auteurs précités ne convergent pas car les espèces trouvées à Kahemba ne sont pas celles trouvées à Idjwi et donc le miel d'Idjwi est différent de celui de Kahemba du point de vue de leur origine florale.

DUBOIS et COLLART (Op.cit) recommandent certaines espèces pour améliorer la production du miel : *Eucalyptus spp, Antigonon leptopus, Callistemon speciosus, Cassia spp, Vitus spp, Casuarina spp, Duranta plumieri, Eugenia spp, Mangifera indica, Flacourtia ramontchi, Jacaranda mimosifolia*, ...

Notre travail a porté sur les Enquêtes éthnomellisologiques et études des différents produits de la ruche de l'ile d'idjwi (territoire d'Idjwi, Sud – Kivu, R.D.Congo). Les objectifs poursuivis dans cette étude étaient de faire un inventaire, une classification des plantes mellifères d'Idjwi.

Pour atteindre ces objectifs nous avons recouru aux méthodes suivantes :

- Les enquêtes ethnobotaniques, les observations, la récolte des produis de la ruche et celle des différents spécimens des plantes. Ces méthodes nous ont donné les résultats suivants :

- L'Idjwi est riche en plantes mellifères. Celles-ci appartiennent toutes à l'embranchement de *Magnoliophyta* avec 111 espèces.

L'étude des formes morphologiques a indiqué la prédominance des plantes ligneuses sur les plantes herbacées.

Les formes biologiques montrent que les phanérophytes sont les mieux adaptés aux facteurs biotiques et abiotiques du milieu.

Les espèces les plus fréquentées par les abeilles étaient : *Harungana montana, H.madagascariensis, Galiniera coffeoides, Chasalia subocreata, Coffea, Eucalyptus globulis, Grevillea robusta* dans les plantations et dans les champs de culture, ce sont les espèces *Phaseolus vulgaris et Sorghum bicolor* qui étaient plus visitées par les abeilles. La récolte des miels correspondait à la floraison de ces espèces.

- La durée de production des miels une fois les abeilles installées dans la ruche est de 3 à 5 mois.

- Nous avons distingué trois membres dans la colonie d'abeille : la reine, les ouvriers, les faux-bourdons ou mâles. Trois produits ont été différenciés sur le terrain à Idjwi. Le miel, la cire et la gelée royale.

Eu égard à ces résultats obtenus, nous formulons les recommandations suivantes :

- Que tous les îlots forestiers restant à Idjwi soient conservés par les autorités locales et qu'il y ait installation des ONG de conservation de la biodiversité.

- Que la réserve de Nyamusisi qui a été détruite soit reconstituée en y suspendant toute activité agricole.

- Que les apiculteurs d'Idjwi soient réunis en association et qu'ils soient dotés des matériels adéquats pour améliorer la production des miels.

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Comparison Study to Choose the Best Congestion Control for Wireless Networks

Ahmed Salah Hameed

Department of Computer and Software Engineering,
College of Engineering, University of Diyala,
Diyala, Iraq

ABSTRACT: Transmission Control Protocol (TCP) provides end to end transmission service which provide a significant contribution in congestion control in the network. TCP throughput is better in wired network than in wireless network, because TCP first designed to work in wired network. The main problem with TCP in wireless network is that no differentiation between network congestion and packet or wireless loss. Many versions of congestion algorithms has been built to accomplish an ideal state of congestion control in both wired and wireless networks. This paper provides a comparison study of congestion control in different popular versions of TCP designed in literature. The aim of this study is to pick up the best procedure to develop a novel version for wireless network which can be developed and used to solve the problem with congestion control in wireless network. According to the comparison, a hybrid TCP that use the network beside the sender and receiver to detect the congestion and processing it, will be the best choice to develop a novel TCP for both wired and wireless networks.

KEYWORDS: TCP Congestion Control; Packets loss; Standard TCP; Network Cooperation TCP; Hybrid TCP.

1 INTRODUCTION

Transmission Control Protocol (TCP) is a connection oriented protocol attached in transport layer. TCP provides end to end transmission service which is also contributing in congestion control in the network. The main features provided by TCP are [1]: flow control, reliability, congestion control, and connection management. TCP shows better throughput in wired network than in wireless and that because TCP first designed to work in wired network.

The aim of this paper is to discuss different development directions for TCP congestion control and pick up the best for wireless network. The standard in comparison is how to solve the problem of differentiation between network congestion and packet or wireless loss. Not only that but also what is the best and compatible for both wired and wireless networks.

2 TCP CONGESTION CONTROL

The important service done by TCP is providing end to end transmission. This service has a significant role in congestion control in the network. Congestion free network which is an ideal network means taking the advantage of all the bandwidth in the network.

Among the most popular versions of TCP congestion algorithms, five different mechanisms of congestion control will be discussed in this paper which are: Tahoe, Reno, Vegas, Modified Reno, and Veno. According to the direction used in developing the congestion control of TCP, the five versions can be classified to three classes as following:

1) The Standard versions in which either the standard congestion control is used or slightly modified model (examples: TCP Tahoe, TCP Reno, and TCP Vegas).

2) Network cooperation versions in which sender, receiver, and network router cooperate to build the congestion control algorithm [2] (example: TCP Modified Reno).

3) Hybrid versions in which two or more mechanisms from different version are mixed to build a new version (example: TCP Veno).

All the TCP versions share the four phases of congestion control used in the standard TCP congestion control algorithm [3]. The four phases of congestion control are mentioned in Table 1. The important factors used by these four algorithms are shown in Fig.1.

Table 1. The four phases of congestion control algorithm

Phase 1	Slow Start Algorithm
Phase 2	Congestion avoidance Algorithm
Phase 3	Fast retransmission Algorithm
Phase 4	Fast recovery Algorithm
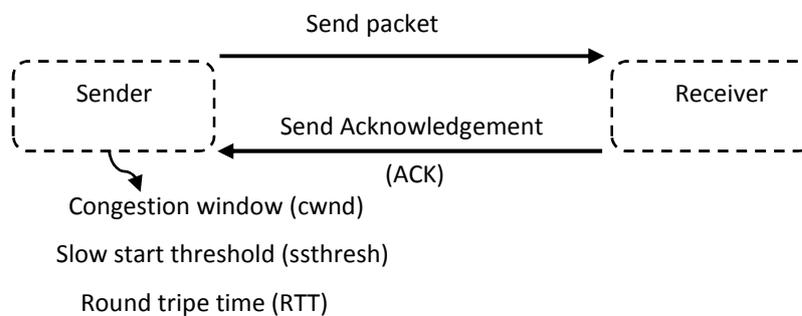
Fig. 1 Common factors used in congestion control

3 TCP VERSIONS

3.1 TCP TAHOE

TCP Tahoe uses only the first three algorithm mentioned in Table 1 which are Slow Start, Congestion Avoidance, and Fast Retransmit [4]. To simplify the idea discussed in [4] algorithm steps with and without congestion will be shown here.

A) The procedure without congestion or loss packet will be as following (All terms taken from Fig.1). The procedure start with congestion window of size equal to one packet and any time we have a complete transmission (the source received an acknowledgement for sent packet before timeout status) the congestion window grow by one packet.

cwnd<= ssthresh
Connection start : cwnd=1 packet.
Each ACK : cwnd+=1 packet.

B) The procedure when we have any one of the following states: the congestion window exceeds the ssthresh, timeout, or receives three duplicate acknowledgements by source.

ssthresh = cwnd/2
cwnd = 1
Congestion avoidance
Fast retransmission
Slow start state: when ACK received for retransmitted packet.

Without going in details of these algorithms we can notice some weak points in this procedure. [4] Tahoe procedure starts with a small size for transmission window which is equal to one packet. As a response to any congestion the window is doped to one packet again. Repeating the procedure of dropping the transmission window for each packet loss or congestion has a severe effect on network bandwidth. This procedure didn't have any solution for the main problem in wireless network which is differentiation between network congestion and packet or wireless loss. All that mean we provide a good TCP for wire network but it is not the good one for wireless network.

3.2   TCP RENO

TCP Reno [5] uses the entire four algorithms for congestion control mentioned in Table 1. The new procedure looks like the one used in TCP Tahoe when respond to timeout. But for three duplicate acknowledgements another procedure will be used which is like following:

ssthresh = cwnd/2.
cwnd = ssthresh + 3. (fast recovery)
first ACK: cwnd +=1.
next ACK cwnd = ssthresh.

The simulation done in [5] uses two senders and two receivers to test different scenarios of congestion control and Round-trip time RTT. According to the results of simulation, the raise of RTT occurs only when there is a congestion in the network. The raise in RTT property is used to timing the sender with the difference of RTT in current cycle and the previous one. The negative sum of RTT differences means we have no congestion in the current cycle of transmission while the positive sum of RTT differences means the transmission is in congestion state or will have a congestion in next cycles. The algorithm of TCP Reno will be like the following:

RTT_diff_sum=0;
when the sender recieves a ACK;
RTT_diff = RTT - RIT_last;
RTT_diff_sum + = RTT_diff;
if(dup_ACKs> =3)
(if(RTT_diff_sum >O) Ilin congestion state
{ssthresh=min(cwnd,rcv_window)/2;
*cwnd = ssthresh+ 3*MSS; //lower transmission rate*
retransmit the lost packet;
} else //in non-congestion state
{ only retransmit the lost packet;
}
}

With all the improvements done in [5], TCP Reno is not the best choice to use with wireless network. The new procedure doesn't provide a way to differentiate between packet loss caused by congestion in network and packet loss when network suffer from random bit error in wireless links.

3.3   TCP VEGAS

TCP Vegas is an extension of TCP Reno [6]. The new model proposed in [6] has no modifications in the main features of TCP. All the modifications related to sender side and how can it provide accurate calculation to network congestion.

TCP Vegas keep using the four algorithms used in TCP Reno so it has the fast retransmit and fast recovery algorithms. New mechanisms used in Vegas to provide accurate calculation to RTT. When the connection start it will use the RTT calculated for the first segment sent. The sender will keep calculating RTT every pre specified time (500ms in [6]) and any increasing in RTT detect congestion in the network.

Vegas also have a new retransmission procedure which is used with duplicated acknowledgments. It calculates RTT for each ACK and depending on it the retransmission decision will be taken. The new procedure used also with normal ACK to make retransmission decision.

The new TCP version has a novel react to timeout and duplicated acknowledgements. With new procedure used in Vegas lost packets can be detect from the first or second duplicate ACK. This procedure will give a chance to detect lost packets those does not have duplicated acknowledgements.

3.4 TCP MODIFIED RENO

In [2] a very novel TCP version has been proposed, see Fig.2. The design provides a new mechanism to differentiate between packets loss caused by high bit error and packets loss caused by network congestion. Sender, receiver and middle router all of these parts cooperate to detect congestion and control it.

The new modified Transmission Control Protocol (TCP Reno) is able to monitor the loss of wireless packets in real time. By detecting a router's buffer mechanism in response to congestion occupancy, the modified Reno is able to monitor wireless packet loss; thus being able to react accordingly and decrease the rate of wireless package loss. This is important because when high volumes of information packets are sent it can have problems reaching the desired recipient. Communication over wireless links [2], between computer networks and various systems, is filled with random rates of high bit error and connectivity that is intermittent due to the frequency of handoffs. Mechanisms such as random early detection (RED) were used to find possible problematic packets in their early stages.

The modified TCP Reno uses Explicit Congestion Notification (ECN), which is an extension of REDs. This mechanism can allow the system to properly tell the difference between random wireless link errors and errors caused by the congestion of network links. It can also monitor the rate at which wireless packets are lost in a manner that helps the sender select the appropriate segment size at the right moment when packet loss is identified. These modifications to Reno, after plenty of tests and simulations, have shown to have merit and even improve the TCP efficiency; it can do this with no changes in the protocol itself which makes the modified Reno easy enough to use.
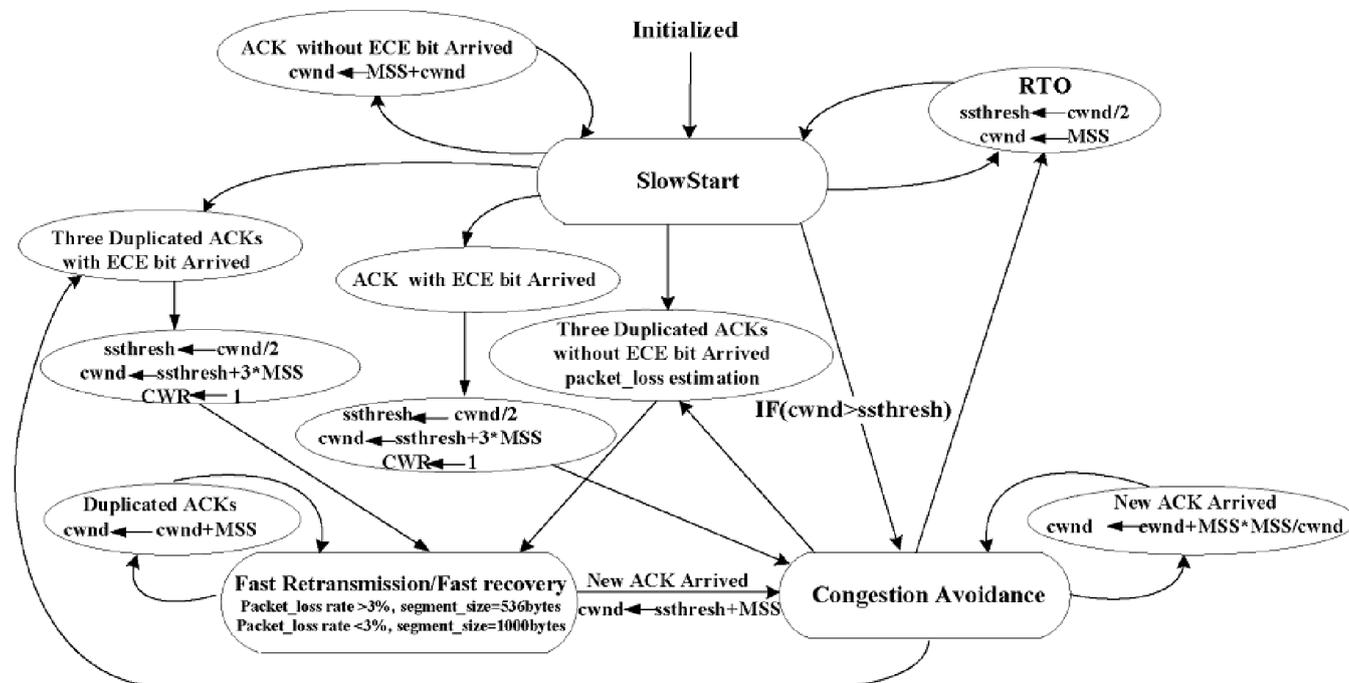

Fig.2 State machine of Modified Reno [2] (Where ECE: Echo of ECE, and RTO: Retransmit timeout)

3.5   TCP VENO

TCP Veno aims to provide the best TCP for both of the wired and wireless networks [7]. Tcp Veno is a combination of two versions of TCP which are Vegas and Reno versions.

TCP Veno proposed in [7] uses the same slow start algorithm of TCP Reno. The new version improves the performance of TCP-Reno by utilizing its Bandwidth Estimation scheme. In order to estimate the state of a connection, TCP-Veno uses a mechanism similar to TCP-Vegas.

Real time experiments done in [7] and showed that TCP Veno has effective work in both wire and wireless networks. By re-visit the distinguishing scheme which is borrowed from Vegas TCP and adopted in Veno TCP, there are two congestion levels - light congestion, and moderate congestion when three duplicate packets are received. At that time, Reno will halve its window, and more aggressive recovery scheme is taken over than that action corresponding to timeout occurrence.

This version is compatible with wire and wireless network but still not providing a complete solution to congestion control problem in wireless network.

4   CONCLUSIONS

This paper discussed the enhancement of congestion control in five different versions of TCP designed in the literature. When the enhancement related to the congestion algorithms without sharing the solution with the network (example: Tahoe, Reno, and Vegas) we do not provide the good solution for congestion control problem in wireless network. Another direction of enhancement is to create cooperation between sender, receiver, and network to detect and process congestion in the network. This direction is valuable for wireless network and provides the best throughput (example discussed in this paper was TCP Modified Reno). The last direction of enhancement discussed in this paper is hybrid TCP and the case was TCP Veno (from Vegas and Reno) and it is provide a good throughput for both wired and wireless networks. The third direction of enhancement is the best choice to develop a TCP congestion control for both wired and wireless network. But to build a novel TCP for wireless network, the paper support the hybrid TCP that use the network beside the sender and receiver to detect the congestion and processing it.

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Comparison on Consumer Acceptabilty and Physico-Chemical Content of Spread from White and Red Flesh Dragon Fruit

Eufemio G. Barcelon[1-2], Leifel Joseph M. Carreon[1], John Elli A. Guillermo[1], Janelle Emry Q. Jacob[1], Sherwin John C. Jocson[1], Gerardo L. Panopio Jr.[1], and Sharmaine D. Rosalinas[1]

[1]University of Santo Tomas, Department of Food Technology, College of Education, Manila, Philippines

[2]Graduate School, University of Santo Tomas, Manila, Philippines

ABSTRACT: Fruit spread is a well–liked food product because it contains less sugar and more fruit ingredient. The potential of a nutritious underutilized red (Hylocereus polyrhizus) and white (Hylocereus undatus) dragon fruit flesh and peel is used to formulate a fruit spread which caters to the growing number of health conscious consumers and to minimize the waste produced in dragon fruit processing. This study aims to determine the consumer acceptability and physico–chemical content of the red and white dragon fruit spreads. Sensory acceptability was performed with 50 untrained consumers, wherein both dragon fruit spreads were determined to gain very high scores. There is, however, a significant difference between spreads from white and red flesh dragon fruit. Spread from red flesh dragon fruit has a sensory acceptability comparable to the commercial fruit spread in all sensory attributes. The content of the red and white flesh dragon fruit spread are: water activity (0.82 & 0.85), pH (4.90 & 5.12), soluble solids (°Brix) (38.65 & 37.67), moisture (46.63 & 40.45), ash (0.68 & 1.16), and fat (0.44 & 0.97). Consumer response on the spread from white and red dragon fruit was deemed to be highly acceptable. The physico-chemical composition of the spread is not comparable with the commercially available spread in terms of pH, fat content, and ash content.

KEYWORDS: *Hylocereus polyrhizus*, *Hylocereus undatus*, fruit spread, consumer acceptability, physico-chemical content.

1   INTRODUCTION

Fruit spreads are manufactured similar to jams and jellies, which are made with various fruits preserved by adding sugar and thickened to a certain extent by application of heat. According to Food and Agriculture Organization (FAO) and World Health Organization (WHO), fruit spreads differ in terms of degree of gel formation and ingredient composition, which makes it an excellent alternative for the jams due to its reduced sugar of 25–50°Brix composition and its generally high percentage of fruits containing vitamins and minerals. [5]

Nowadays, more people are inclined to living a healthy lifestyle, which involves healthier food options. As a response to the current trend, the formulation of a fruit spread from red dragon fruit (*Hylocereus polyrhizus*) and white dragon fruit (*Hylocereus undatus*) aims to maximize its utilization by using both of the dragon fruit's flesh and peel to increase the nutritional value of the fruit spread.

The dragon fruit is a perennial, fast-growing, climbing vine cactus specie (Gunasena, Pushpakumara & Kariyawasa, 2006) [6] that belongs to the family of Cactacea and originated in the regions of Mexico and Central & South America (Barthlott & Hunt, 1993) [2]. It has obtained attention during the recent years, mostly in Asian countries. This is due to its color and its nutritional content (Hoa, Clark, Waddell & Woolf, 2006) [7], and its variety of uses.

Eufemio G. Barcelon, Leifel Joseph M. Carreon, John Elli A. Guillermo, Janelle Emry Q. Jacob, Sherwin John C. Jocson, Gerardo L. Panopio Jr., and Sharmaine D. Rosalinas

Red dragon fruit (*H. polyrhizus*) and white dragon fruit (*H. undatus)* are two varieties commonly known in the market. According to Gunasena, et al. (2006) [6], its flesh is eaten raw or processed into a range of industrial products such as juice, sherbets, ice cream, yogurt, candy and pastries. The peel, which is considered as a by–product in fruit processing, is also useful. Recent studies of Moshfeghi, Mahdavi, Shahhosseini, Malekifar & Taghizadeh (2013) [10] used the peel as a color powder and natural food additive in milk, yoghurt, pastry, juice and rice. In addition, studies show that dragon fruit peel is also used as a raw material in making tea-infused drinks and jams, as well as in producing fruit peel flour (Sari & Hardiyanti, 2013 [13]; Dam, 2013 [3]; Mustafa, et al., 2013 [11]), which have a number of benefits.

Dragon fruits represent a significant source of vitamins B1, B2, B3, and C minerals, namely potassium, sodium, calcium, iron and phosphorus. It also contains nutrients, such as fat, protein, carbohydrate, flavonoid, crude fiber, thiamin, phytoalbumin, niacin, pyridoxine, kobalamin, glucose, betacyanins, phenolic, carotene and polyphenol (Le Bellec, Vaillant, & Imbert, 2006) [8]. In 2007, Davis stated that the dragon fruit has relatively high antioxidant activity in comparison with other subtropical fruits. [4] Moreover, it aids in preventing colon cancer and diabetes, neutralizing toxic substances like heavy metals, reducing cholesterol and high blood pressure, as well as assisting in the development of strong bones, teeth and skin (Gunasena, et al., 2006) [6]. Furthermore, Nurmahani, Osman, Abdul Hamid, Mohamad, & Pak Dek (2012) noted its peel to have antibacterial property [9]. A study by Jamilah, Shu, Kharidah, Dzulkifly, & Noranizan (2011) also detrmined it to be a good source of fiber and pectin, and it is useful as a natural colorant. [12]

The general objective of the study is to determine the consumer acceptability and the physico–chemical content of red (*H. polyrhizus*) and white (*H.undatus*) dragon fruit spreads.

2 MATERIALS AND METHODS

First, the red dragon fruit (*H. polyrhizus*) and the white dragon fruit (*H. undatus*) were sorted and washed thoroughly to eliminate dirt and dust. Withered and hard wooden portions of the peel were trimmed and removed. The dragon fruits were then sliced in half and the flesh was spooned out from the peel. Once the peel and flesh were separated, each underwent individualized prior treatment. After which, the fruit peels were cut in 1x5 cm strips, blanched for two minutes, and then pureed using an osterizer, while the fruit flesh was mashed. Four parts of peel puree and six parts of mashed flesh were then combined. The mixture was transferred in a sauce pan, and then sugar was added, wherein two parts of sugar for every eight parts of dragon fruit flesh and peel mixture were used. The mixture was cooked at 70°C and was stirred continuously until desired smooth texture was obtained. Cinnamon powder and vanilla extract were added next. Finally, with all the ingredients mixed completely, the fruit spreads were packed immediately in a sterilized jar.

2.1 PHYSICO–CHEMICAL ANALYSIS OF DRAGON FRUIT SPREAD

The physico–chemical analysis was performed in triplicate with results expressed as mean ± standard deviation. The fat, ash and moisture analysis was performed based on the standard methods of the Association of Official Analytical Chemists (AOAC, 2012), wherein water activity was determined using a Novasina water activity meter, pH using a Jenway 350 portable laboratory pH meter, and total soluble solids ($^{\circ}$Brix) using Atago refractometer.

2.2 SENSORY EVALUATION OF DRAGON FRUIT SPREAD

Fifty untrained consumers participated in an acceptability test. The 7–point Hedonic scale was used to evaluate the spread with the following parameters: appearance, color, aroma, spreadability and flavor. The scale ranged from excellent (7) to extremely poor (1). The 9–point Hedonic scale was used to evaluate the general acceptability. The scale ranged from like extremely (9) to dislike extremely (1).

3 RESULTS AND DISCUSSION

3.1 CONSUMER SENSORY ACCEPTABILITY OF RED AND WHITE FLESH DRAGON FRUIT SPREAD

Consumer sensory acceptability test of red and white flesh dragon fruit spreads and commercial spread, as shown in Figure 1, was presented to the untrained panelists.

Figure 1: From left to right – Red flesh dragon fruit spread, white flesh dragon fruit spread, and commercial strawberry spread

Results of sensory acceptability of red and white flesh dragon fruit spread garnered acceptable scores above the 4–point acceptable level of the Hedonic scale for product development as illustrated in Figure 2. Based on the aforesaid sensory data obtained, analysis of variance (ANOVA) was done to determine if the fruit spreads differ significantly from one another.
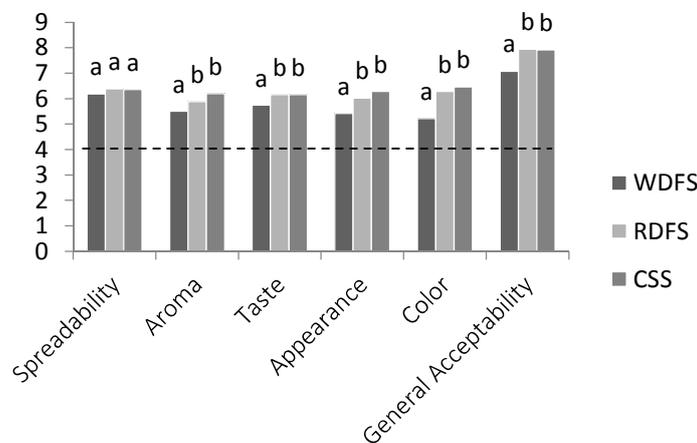
Figure 2: Consumer acceptability scores of two variations of dragon fruit spreads and control with 7–point Hedonic scale, except for the parameter general acceptability with 9–point Hedonic scale. The broken line was fitted to indicate the acceptable level of sensory analysis. A different letter on the same attribute showed the significant difference (p < 0.05).

Results showed that the white dragon fruit spread (WDFS), the red dragon fruit spread (RDFS) and the commercial strawberry spread (CSS) were comparable to one another in terms of spreadability, with noted scores ranging from 6.18 to 6.38.

Aroma, taste, appearance, color and general acceptability of the RDFS garnered the following scores: 5.88, 6.16, 6.02, 6.28 and 7.94 respectively. On the other hand, the CSS noted the following scores: 6.2, 6.16, 6.28, 6.46 and 7.92 respectively. There were similarities in the scores shown for both spreads, whereas WDFS, (with the following scores: 5.5, 5.74, 5.42, 5.22 and 7.08 respectively) showed significantly lower results as compared to aforementioned spreads. The high scores achieved from the sensory evaluation of RDFS confirm its very high acceptability to consumers when contrasted with WDFS results.

3.2   PHYSICO-CHEMICAL CONTENT OF RED AND WHITE FLESH DRAGON FRUIT SPREAD

The soluble solid (^{O}Brix) of WDFS (37.67), RDFS (38.65), and CSS (37.13) were comparable to one other as seen in Table 1.

Eufemio G. Barcelon, Leifel Joseph M. Carreon, John Elli A. Guillermo, Janelle Emry Q. Jacob, Sherwin John C. Jocson, Gerardo L. Panopio Jr., and Sharmaine D. Rosalinas

Table 1: Physico–Chemical Content of Dragon Fruit Spread

Physico–Chemical Composition	SPREAD		
	White Dragon Fruit	Red Dragon Fruit	Commercial Strawberry
Aw	$0.85^a \pm 0.01$	$0.82^b \pm 0.01$	$0.82^b \pm 0.01$
pH	$5.12^a \pm 0.13$	$4.90^b \pm 0.10$	$3.93^c \pm 0.02$
Soluble Solids ($^\circ$B)	$37.67^a \pm 1.53$	$38.65^a \pm 0.31$	$37.13^a \pm 0.23$
Moisture Content%	$53.17^a \pm 0.43$	$55.42^b \pm 0.33$	$55.50^b \pm 0.64$
Ash Content%	$1.16^a \pm 0.02$	$0.68^b \pm 0.04$	$0.21^c \pm 0.002$
Fat Content%	$0.97^a \pm 0.27$	$0.44^b \pm 0.09$	0^c

*Mean values ± standard deviation of three trials. A different letter on the same attribute showed the significant difference ($p < 0.05$).

Water activity and moisture content of WDFS (0.85 & 53.17) were significantly different from RDFS (0.82 & 55.42) and CSS (0.82 & 55.50), whereas RDFS and CSS were equal to each other. RDFS, WDFS and CSS were notably different from one another in terms of pH, with values ranging from 3.93 to 5.12; ash content, with values ranging from 0.21 to 1.16; and fat content, with values ranging from 0 to 0.97.

4   CONCLUSION

The red flesh dragon fruit spread was more accepted and preferred by the consumers than the white flesh dragon fruit spread based on the following parameters: appearance, color, aroma, spreadability, flavor and general acceptability. The bright red violet color and natural sweetness of the red flesh dragon fruit contributed to its high preference. The red flesh dragon fruit spread, therefore, has greater potential for development and a larger scope for market value once produced.

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Species composition of fruit flies (Dipteral:Tephritidae) and extent of damage on mango fruit in eastern Ethiopia

Dawit getahun[1], Feredu Azerefegne[2], and Yibrha Beyeneh[2]

[1]Adigrat University, College of agriculture and environmental science, Department of Plant science, Adigrat, P.O Box 50, Ethiopia

[2]Hawassa University, College of Agriculture, Department of Plant science, Hawassa, P.O Box O5, Ethiopia

ABSTRACT: A study was conducted to determine the species composition of fruit flies attacking mangoes and, the extent of mango fruit losses in selected areas of eastern Ethiopia. Fruit flies were collected using two methods; rearing from mango fruits and trapping with the use of Para pheromones. Six species of Tephritidae were reared from mango fruits: Ceratitis fasciventris, Ceratitiscosyra, Bactroceracucurbitae, Dacusbivittatus, Ceratitisquinaria and Ceratitiscapitata. 83.1 %, 12.8%,. 2.7%, 0.7 %, 0.4 % and 0.21%, respectively. Nine fruit flies species, four of the genus Ceratitis, (C. cosyra, C. quinaria, C. capitata and C. fasciventris), three of Dacus (D. bivittatus, D. telfairae and D. apoxanthu), and two of Bacterocera (B. invadens and B. cucurbitae), were collected using different parapheromones (Methyl eugenol, Cuelure, 3Component lure, Trimedlure and Terpinyl Acetate)from mango farms in eastern Ethiopia. Using pheromone traps three new fruit fly species were identified. Out of all species Ceratitisfasciventris were dominant followed by Ceratitiscosyra and Dacusbivittatus. All species has no relation with altitude. The extent of mango infestation on the average ranged 21 to 35% in different locations of Eastern Ethiopia. The overall mean percentage of mango losses is 30.4%.

KEYWORDS: fruit fly, species composition, par pheromone, traps.

1 INTRODUCTION

Many species of fruit flies attack different types of commercial and wild fruits and vegetables, causing considerable damage to agricultural crops [3].

[9]In Africa about 950 species and 150 genera of fruit fly (Tephritidae) are known, out of which 299 species develop in either wild or cultivated fruits. Some were accidentally introduced in Africa from other regions, in particular from Asia [4]. Asian fruit flies from genus Bactrocera are regarded as some of the destructive insects of fruit [11]. The presence of *Bactrocerainvadens* in the southern and western Ethiopia was reported [6]

Mango originated in South-East Asia and introduced to all other tropical regions. In each region where it is grown, mango is attacked by fruit flies from different genera: *Anastrepha, Bactrocera*, *Ceratitis* and *Dacus*. The genus *Ceratitis* is endemic to the Afro tropical region, and contains about 65 species, the majority of which are highly polyphagous [11]. Mango is commonly attacked by varying combinations of four major species across Africa: *C.cosyra, C. fasciventris*, *C. rosa*and *C. sanonae* and much less frequently, by *C. capitata* [8]

Fruit flies attack ripe mangoes and inflict damage to the fruit either directly (larvae feeding on pulp) or by causing blemished fruit, which limits marketing possibilities (especially export of fruit [1]. Of the 1.9 million tons of mangoes produced in Africa annually, about 40% is lost due to fruit flies where infestation rates vary among countries and seasons, ranging from 5% to 100% [8].

Different factors attribute for the level of fruit infestation and extent of loss by fruit flies. The level of mango fruit ripening can influence the extent of damage by post harvest diseases and insect pests [7]. The type of mango cultivar could also influence fruit flies attack. It is known that each species of fruit might be attacked by a number of fruit fly species and the importance of the fruit fly species may differ according to the type of the fruit and the area [11]. The species composition and relative abundance of fruit flies are also important factors of attacks.

Studies on the species composition of fruit flies attacking various fruits in Ethiopia are lacking. Earlier studies have shown that *C. capitata* was present in many parts of the country [10; 5; 2; 6]. In the eastern Ethiopia and the central Rift Valley regions both *C. capitata* and *C. fasciventris* are the co-dominant species [6]. *C. fasciventris* was earlier identified on mangoes at Upper Awash Agro-Industry Enterprise (UAAIE) [2]. Knowledge on the species of fruit flies is basic to design monitoring methods and development of appropriate management practices. Therefore this study was conducted to determine the species composition of fruit flies attacking mangoes and and the extent of mango fruit losses they cause in selected areas of eastern Ethiopia.

2 MATERIALS AND METHODS

2.1 DESCRIPTION OF STUDY AREA

The study was conducted in Woredas (districts) of Babile, Bedeno, Erergota. Gursum and Harari regional state, areas known for mango production in eastern Ethiopia (Table 1). Babile Woreda is located to 557 km from Addis Ababa and on $9^0 12^{'} 930^{''}$ N and $42^0 18^{'} 061^{''}$E with an elevation of 1200-1800m above sea level. (Information collected from Agricultural and Rural Development Office of Babile Woreda).

Babile woreda ($9^0 12^{'}930^{''}$N and $41^0 21^{'}457^{''}$E.) the altitude of this wored ranges from 1200-1800 above sea level. The minimum temperature of the woreda is 10^0C and with the maximum of 20^0c. This wored have an annual rain fall of over 600mm. (information collected from agricultural and rural development office of Babile woreda)

Badano woreda ($9^0 31^{'}459^{''}$N and $41^0 21^{'}457^{''}$E)the altitude of this woreda ranges from 1200-3100 above sea levelThe rain fall of the woreda are binomial with medium amount of rain fall in "Belg" which last from March to April and main rainy season "Keremt" which is from June to September

Gursum woreda is located 600 km from Addis Ababa, at ($09^0 37^{'}320^{''}$N and $042^0 43^{'}820^{''}$E) with an elevation of 1400-2300m above sea level.

Harari regional state is located on 535km distance from Addis Ababa and with an elevation ranges from 1300-2200m.a.s.lat 9° 15' 00" N and 42° 10' 00" E.. Temperature is even between 17.1^oc-20.2^oc throughout the year.

Erergotaat $09^0 54^{'}939^{''}$N and $41^0 03^{'}913^{''}$E with an average elevatin 824 meter above sea level. the minimam and maximam temperature of the district is 19^0 c and 31^0c respectively. a sample enumeration performed by the CSA in 2001 interviewed 2870 farmers in the woreda, who held an average of 0.4 hectares of land.

Location	Positions	Altitude	Temp range	Rainfall
Babile	$9^0 12^{'} 930^{''}$ N, $42^0 18^{'} 061^{''}$E	1200-1800m	10^0C- 20^0c	600 mm
Badano	$9^0 31^{'}459^{''}$N, $41^0 21^{'}457^{''}$E	1200-3100	16^0c- 27^0c	1926mm
Error Gota	$9^0 31'59.988"$N, $41023^{'}60.000"$E	824	19^0c -31^0c	150-1000
Gursum	$09^0 37^{'}320^{''}$N, $42^0 43^{'}820^{''}$E	1400-2300m	14^0C- 24^0C	650-850mm
Harari	9° 15' 00" N, 42° 10' 00" E	1300-2200m	17.1^oc-20.2^oc	750- 1,509 mm

2.2 DETERMINATION OF FRUIT FLY SPECIES ON MANGOES

Two methods of sampling were employed to collect the species of fruit flies, rearing of larvae to adult stage from infested mango fruits and trapping of adult fruit flies using Para pheromones lures.

2.2.1 REARING OF FRUIT FLIES FROM MANGO FRUITS COLLECTED FROM DIFFERENT AREAS OF EASTERN ETHIOPIA

In each wored a three mango farms were surveyed and from each farm five kg ripe mango fruits with ovipunctures of fruit flies were sampled. The fruits were kept in plastic bucket of 10 liters capacity with moistened fine sand at the bottom for pupation and left in the bucket for 30 days.

The plastics were covered by cotton cloth to allow air circulation but keep the emerging flies inside the plastic. The plastic containers were checked every 3-4 days for puparia and adult flies. Puparia were sieved from sand and placed in transparent glass (Petri dish) for adult emergence. The flies in the bucket were kept until all died and collected and preserved in vials containing ethanol 97% for further identification.

2.2.2 COLLECTION OF FRUIT FLIES USING DIFFERENT PARAPHEROMONES IN EASTERN HARAGHE

Five different parapheromones namely Cue lure, Methyl Eugenol (ME), Trimedlure (TML), 3 components Lure (3C), and Terpinyilacetae (TA), were used to attract the fruit flies. Empty water bottles of one-liter capacity were used for making a modified trap bottle. Entry holes with a diameter of 2.5cm were punched at four equidistant places at 2/3level of the bottle using hot iron rod and the solid baits were placed in the bottle except Terpinyl acetate which is liquid and it is placed in the bottle using piece of cotton wick. Solid dichlorovos (Vapona) were used to kill the fly in the bottle. The trap bottles with the baits were suspended with a string on mango trees at a height of two to three meters from the ground for three days. Each lure was replicated three times in each area. The trapped flies were preserved in vials containing ethanol 97% for further identification. New water bottles traps were used to avoid contamination of the outer surface of the bottles with the baits which may keep the flies to settle to the outer side of the bottle instead of getting in.

The abundance and dominance of fruit fly species were determined with the formula used by Shorma (2004)

A= (∑W/N), where A =Abundance, ∑w=sum of individual of a particular fruit fly species across all samples, N=total number of samples.

The dominance of fruit fly species was determined using the formula

D=Ax100/ (∑W), where D=Dominance of particular species   A=abundance of the same species,

∑w= total abundance of an individual fruit fly species in relation to total fly abundance.

Descriptive statistics was used to compare the relative abundance of the species of fruit flies attacking mangoes.

2.3 DETERMINATION OF THE EXTENT OF YIELD LOSS ON MANGOES BY FRUIT FLIES

A minimum of 10Kg of ripe mango fruits were sampled from each farm and sorted in to "Infested" and "Non Infested" categories by examining rotting and the ovipunctures of fruit flies. Each category were counted and weighed. The clean looking mango fruits were kept in fruit containers for a week then dissected for the presence of fruit fly larvae. The proportions of damaged fruits were added in to "Infested" category to recalculate the level of infestations. The data were subjected to ANOVA and means were separated using Tukeys HSD test at P=0.05.ewith SAS Statistical Program.

3 RESULTS

3.1 FRUIT FLY SPECIES FROM MANGO FARMS IN DIFFERENT DISTRICTS OF EASTERN HARARGHE

Table 1. Species of fruit flies reared from mango fruit collected from different woredas of Eastern Ethiopia, 2010.

Tephritid Species recorded	Number of adult fruit flies reared /kg mango fruit					
	Babile	**Gursum**	**Harar**	**Bedano**	**Erergota**	**Total %**
Bactroceracucurbitae	6	4	8	5	3	2.7+0.86
Ceratitiscapitata	2	0	0	0	0	0.2+0.39
Ceratitiscosyra	34	34	37	15	4	12.8+0.24
Ceratitisfasciventris	134	175	223	178	93	81.1+0.26
Ceratitisquinaria	0	1	2	0	1	0.4+0.25
Dacusbivittatus	1	1	3	2	0	0.7+ 0.51
Total number	177	215	273	200	101	

Table 2. Total species of fruit flies collected in mango farms in different woredas of eastern Hararghe using different Para pheromones, 2010

Species recorded	Number of fruit flies/trap /day collected by different Para pheromones							
	ME	TML	CUE	3C	TA	Total	%	Abundance
Bactroceracucurbitae	0	6	57	8	3	74	4.7+10.7	14
Bactrocerainvadens	11	37	3	0	0	51	3.2+6.9	10.2
Ceratitiscapitata	0	2	0	0	2	4	0.3+0.48	0.8
Ceratitiscosyra	0	0	1	49	164	214	13.6+31.3	42.8
Ceratitisfasciventris	0	357	8	327	511	1203	76.3+13.5	240.6
Ceratitisquinaria	0	0	0	0	8	8	0.5+1.6	1.6
Dacusapoxanthus	0	0	0	1	0	1	0.1+0.2	0.2
Dacusbivittatus	2	0	18	0	0	20	1.3+3.5	4
Dacustelfairae	0	0	0	1	0	1	0.1+0.2	0.2
Total	**13**	**402**	**87**	**387**	**688**	**1576**		

NOTE: ME = Methyleeugnole, CUE = Cuelure TA = Terpinyl acetate, 3C = Three component lure, TML = Trimedlure, + =SE.

Table 3. Fruit fly species trapped by different Para pheromone in Erergota, eastern Haraghe, Ethiopia, 2010.

	Number of fruit flies/trap /day collected by different Para pheromones							
Fruit fly Species	ME	CUE	TML	3C	TA	Total	%	Abundance
B. invadens	11	3	37	0	0	51	60.7+7.53	10.2
B. cucurbitae	0	0	1	0	0	1	1.2+2.17	0.2
D. bivittatus	2	0	0	0	0	2	2.4+0.44	0.4
C. cosyra	0	0	4	0	4	8	9.5+0.89	1.6
C. fasciventris	0	0	11	0	10	21	26.2+0.22	4.2
Total	13	3	53	0	14	83		

NO TE: ME = Methyleeugnole, Cue = Cuelure, TA = Terpinyl acetate, 3C = Three component lure TML=Trimedlure, + = SE

Table 4.Species of fruit flies trapped by different Para pheromone in Babile area, eastern Haraghe, Ethiopia, 2010.

Fruit fly Species	Number of fruit flies/trap /day collected by different Para pheromones							
	ME	CUE	TML	3C	TA	Total	%	Abundance
B. cucurbitae	0	2	2	0	1	5	1.6+0.44	1
C. cosyra	0	0	0	9	27	36	11.+5.07	7.2
C. fasciventris	0	1	71	91	103	266	85.8+22.15	53.2
C. quinaria	0	0	0	0	5	5	0.7+1.00	1
D. telfaireae	0	0	0	1	0	1	0.3+0.2	0.2
Total	0	3	73	101	136	313		

NO TE: ME = Methyleeugnole, Cue = Cuelure, TA = Terpinyl acetate, 3C = Three component lure TML=Trimedlure, + = SE

Table 5. Species of fruit flies trapped by different Para pheromones in Gursum, eastern Haraghe, Ethiopia, 2010.

Fruit fly Species	Number of fruit flies/trap /day collected by different Para pheromones							
	ME	CUE	TML	3C	TA	Total	%	Abundance
B.cucurbitae	0	1	0	0	0	1	0.85+0.2	0.2
C. cosyra	0	0	0	0	1	1	0.85+0.2	0.2
C. fasciventris	0	2	39	34	40	115	98.3+9.06	23
Total	0	3	39	34	41	117		

NOTE: ME=Methyleeugenol, Cue=Cuelure, TA=Terpinyl acetate, 3C=Three component lure, TML=Trimedlure, + = SE

Table 6. Fruit flies species trapped by different Para pheromones in Bedano, eastern Haraghe Ethiopia, 2010.

Fruit fly Species	Number of fruit flies/trap /day collected by different Para pheromones							
	ME	CUE	TML	3C	TA	Total	%	Abundance
B. cucurbitae	0	12	2	0	2	16	2.82+2.25	3.2
C. cosyra	0	1	0	13	58	72	12.7+11.2	14.4
C. fasciventris	0	2	107	141	227	477	84.3+4331	95.4
D. apoxanthus	0	0	0	1	0	1	0.2+0.2	0.2
Total	0	15	109	155	187	566		

NOTE: ME=Methyleeugenol, Cue=Cuelure, TA=Terpinyl acetate, 3C=Three component lure, TML=Trimedlure, + =SE

Table 7. Species of fruit flies trapped by different Para pheromones in Harari, eastern Ethiopia, 2010

Fruit fly Species	Number of fruit flies/trap /day collected by different Para pheromones							
	ME	CUE	TML	3C	TA	Total	%	Abundance
B. cucurbitae	0	42	1	8	0	51	10+8.1	10.2
D. bivittatus	0	18	0	0	0	18	3.6+3.59	3.6
C. capitata	0	0	1	0	2	3	0.69+0.39	0.6
C. cosyra	0	0	0	27	74	101	20.1+14.4	20.2
C. fasciventris	0	3	129	61	131	324	64.8+28.8	64.8
C. quinaria	0	0	0	0	3	3	0.6+0.6	0.6
Total	0	63	131	96	210	500		

NOTE: ME=Methyleeugenol,   Cue=Cuelure,   TA=Terpinyl acetate,   3C=Three component lure,   TML=Trimedlure, + = SE

3.2   DISTRIBUTION OF FRUIT FLY SPECIES IN RELATION TO ALTITUDE

Table 8. The relationship between altitude and composition of fruit flies species in Eastern Ethiopia, 2010

Fruit fly species	Range of Altitude (m.a.s.l)	Relationship	p-value
Bactroceracucurbitae	785-1684	y = 0.006x - 3.3934 $R^2 = 0.0332$	0.51
Bactrocerainvadens	785 -874	y = -0.0175x + 27.695 $R^2 = 0.3442$	0.021**
Ceratitiscapitata	1491-1554	y = 0.0004x - 0.2787 $R^2 = 0.027$	0.56
Ceratitiscosyra	785-1673	y = 0.0092x + 1.5536 $R^2 = 0.0437$	0.45
Ceratitisfasciventris	785-1684	y = 0.067x - 11.623 $R^2 = 0.1404$	0.17
Ceratitisquinaria	1575		
Dacusbivittatus	785-1575	y = 0.0014x - 0.6418 $R^2 = 0.0105$	0.71
Dacustelfaireae	1669		
Dacusapoxanthus	1271	y = -7E-05x + 0.1681 $R^2 = 0.0089$	0.73

* = significant R^2= Regression coefficient

3.3   EXTENT OF MANGO INFESTATIONS BY FRUIT FLIES IN DIFFERENT FARMER'S FIELD IN EASTERN HARARGHE, ETHIOPIA, 2010

Table.10. The extent of mango fruit infestation by fruit flies different areas of Eastern Hararghe

Area	Total number of fruit sampled	% number of fruits infested
Babile	162	34.4±5.1[ab]
Gursum	167	33.4±4.9[ab]
Harari	184	35.4±4.43[a]
Bedeno	181	21.6±4.4 [b]
ErerGota	180	26.9±2. 2[ab]
C V		13.8

Means followed by the same letter within a column are not significantly different according to Tukey's HSD test at P<0.05. ± = standard error of the mean

4   RESULT AND DISCUSSION

4.1   FRUIT FLY SPECIES REARED FROM MANGO FRUITS

Six species of fruit flies were reared from mango fruits in selected fruit growing areas of eastern Ethiopia with a composition of *C. fasciventris*81.13%, *C. cosyra*12.8%, *B.cucurbitae*2.69%, *D. bivittatus*0.72%, *C.quinaria*0.41 % and *C. capitata*0.21% (Table 1). *C. fasciventris* was the dominant species in all districts followed by *C. cosyra.* The highest number of fruit flies was recorded in Harari Woreda followed by Gursum and the lowest in Erer Gota. *B. cucurbitae* was the third numerous species, followed by *D. bivittatus, C. quinaria*and *C. capitata* in descending order.

Out of all the fruit flies reared from mango fruits only three of the species, *C. capitata,* C *fasciventris* and *D. bivittatus,* were previously recorded in Ethiopia (Azerefegne*et al*., 2007), while the remaining three species, *B. cucurbitae, C. cosyra*and *C. quinaria*, are new records.

The African invading fruit fly *(B. invadens)* was not reared from mango fruits sampled in ErerGota although it was trapped by Parapheromone. *B. invadens* being a recent introduction to the continent and the country its retrieval only in the lure traps but not in fruits could be due to its recent introduction and establishment in the area the low sample size of fruits.

4.2   FRUIT FLY SPECIES COLLECTED IN MANGO FRUIT FARMS IN EASTERN HARARGHE USING DIFFERENT PHARAPHEROMONE

Nine fruit flies species four s of the genus *Ceratitis, (C. cosyra*, *C. quinaria, C. capitata* and *C. fasciventris),* three of *Dacus* (*D. bivittatus, D. telfairae* and *D. apoxanthu*), and two of *Bacterocera* (*B. invadens* and *B. cucurbitae*) were collected using different parapheromones from mango farms in eastern Ethiopia(Table 2).

The paraphermones differed in the species of fruit flies they attracted; Cue lure attracted *B. cucurbitae, C. cosyra, C. fasciventris, D. apoxanthus* and *D. telfaireae,* and TA *B. cucurbitae, C. cosyra, C. fasciventris*, *C. quinaria* and *C. capitata.* TML attracted *B. cucurbitae*, *C. fasciventris*, *C. capitata* and *B. invadens*, 3C attracted *B. cucurbitae, C. fasciventris, C. cosyra* and *D. telfaireae* while ME attracted *B. invadens* and *D. bivittatus*only at Erergota (Table3).

*B. invadens*is anew species record for eastern Hararghe, which was collected by ME, TML and Cue lure at Erergota (Table 3). Other new species, *D. telfairae* and *D. apoxanthus,* were collected only by the 3C in very low numbers at Babile and Bedeno, respectively (Table 4 and 6) while low number of *C. quinaria* were trapped only by TA at Harari (Table 7). De Meyer, (2001a) and White and Elson-Harris (1992) reported that males of *C. cosyra* do not respond well to commercially available parapheromone lures such as Trimedlure (TML), CueLure, or Methyl Eugenol (ME). As this report they do respond, however, to terpinyl acetate, β-caryophylene and several other terpenoids. Females respond to food baits such as Nulure. In this research *C. cosyra* was collected with Cue Lure. Males of *C. capitata* respond well to TML, and to a certain extent also to terpinyl acetate and other terpenoids and females respond to Nulure (De Meyer,2001b).The numbers of fruit flies were more abundant in the Bedeno, Harari and Babileworedas than in the Gursum and Erergota (Table 2)

A Total of 1576 fruit flies were caught by the different Para pheromones. Terpinyl acetate attracted 511*C. fasciventris* 164,*C. cosyra*, Trimedlure1576 *C. fasciventris* and 37*B. invadens*), 3C327 *C. fasciventris* and 49 *C. cosyra*, Cue lure (57 *B. cucurbita* and 18 *D. bivittatus* and Methyl Eugenol 11 *B. invadens*and2 *D. bivittatus)* (Table 2).

The African invading fruit fly *B. invadens* which is described as a new polyphagus species and originally from the Indian sub continent was recorded and has invaded tropical Africa (Drew et al., 2005). Initially, the new fruit fly species was

identified as *B. dorsalis* because it is morphologically similar (Drew *et al*., 2005). It was recorded in Kenya in February 2003 and it also invaded Democratic Republic of Congo, Senegal and Tanzania (Anonymous, 2005). *B. invadens* was new for Eastern Ethiopia. During the survey conducted in 2007 *B. invadens* was reported only from southern and western Ethiopia including Arbaminch, Asossa, Arjo, Bako, Gambella, Gibe, Ghimbi, and Welkitie on guava and mango (Azerefegne*et al*., 2007). The current study showed that *B. invadens* has established in some parts of eastern Ethiopia.

C. fasciventris was the most numerous fruit fly species present in all mango farms of eastern Ethiopia in this study, except at Erergota in which *B. invadens* was dominant (Table 3). A survey conducted in 2007 both *C. capitata* and *C.fasciventris*were the co-dominant species in the eastern Ethiopia (Azerefegne *et al*., 2007). *C. fasciventris* was identified for the first time in 2006 on mangoes at Upper Awash Agro-Industry Enterprise (UAAIE) (Birtukan, 2006). *B. cucurbitae* principally an Asian species is a new record foreastern Ethiopia (Table 2-7). The first specimens of *B. cucurbitae* in collections date from the early 1930s from the African mainland, as well as from Mauritranian and Reunion islands (White *et al*, 2001;), but it might have been established much earlier. It is currently reported from several countries in East and West Africa: Benin, Burkina Faso, Cameroon, Gambia, Guinea, Ivory Coast, Mali, Niger, Nigeria, Senegal and Togo in western Africa, and Kenya, Sudan, Tanzania and Uganda in eastern Africa (White, 2006).

C. cosyra was recorded for the first time in the country in all surveyed woredas except in Babile (Table 4). *C. cosyra*, commonly known as the mango fruit fly is a serious pest in smallholder and commercial mango across sub-Saharan Africa and has been recorded in Ivory Coast, Kenya, South Africa, Tanzania, Uganda, Zambia and Zimbabwe, where it is more destructive than either the Mediterranian fruit fly (*C. capitata*) or the natal fruit fly(*C. rosa*) (Malio 1979; Labuschagne*et al*. 1996; Javaid 1979; Rendell *etal.* 1995; Lux *et al*., 1998).

C. quinaria is another new fruit fly species recorded in Ethiopia for the first time in Harari region (Table 7). Geographically it was distributed in Africa: Botswana, Malawi, Namibia, South Africa, Sudan, Zimbabwe and Asia: Yemen. Like many *Ceratitis spp.*, it is attracted to terpinyl acetate but not to Cue lure and trimedlure (Cunningham, 1989). *C. quinaria*was collected withTA only in this research. *D. bivittatus* and *D.telfairae* were also new species recorded in Ethiopia. *D. bivittatus*is distributed from Senegal East to Kenya, and south to South Africa; while *D. telfairae* was reported from Kenya, Tanzania, Malawi, Zimbabwe (Liquido*et al.,* 1989)

4.3 DISTRIBUTION OF FRUIT FLY SPECIES IN RELATION TO ALTITUDE

C. cosyra, *C. fasciventris*, and *Dacusbivittatus* were collected in wider altitudinal ranges (Tabl8). *C. capitata* was recorded only around 1500masl. *Ceratitisquinaria, D. telfaireae* and *Dapoxanthus* has restricted altitudinal ranges. In this study, *B. invadens* was recorded in the lower altitudes only and its number decreased with the increase in altitude (y = -0.0175x + 27.695, R^2 = 0.3442, P=0.021). The other fruit fly species did not show clear relationship with the altitude. This might be as a result of very few data sets used and there is a need for extensive surveys to make concrete conclusion

4.4 EXTENT OF MANGO INFESTATIONS BY FRUIT FLIES IN DIFFERENT FARMER'S FIELD IN EASTERN HARARGHE, ETHIOPIA, 2010

The extent of mango infestation by fruit flies on the average ranged from 21 to 35% in different locations of Eastern Ethiopia (Table 3). High infestations were recorded in Harari, Babile and Gursum with respective mean infestations of 35.43%, 34.43% and 33.40% (Table 10). The lowest infestation (21.6%)was observed in Bedano. Infestation levels vary among seasons, countries, regions, agro-ecological areas and cultivars (Vayssièresa et al 2009). Lux e*t al* (2003a) reported that of the 1.9 million tons of mangoes annually produced in Africa about 40% was lost due to fruit flies although these data concern losses before the arrival of the exotic fly *B. invadens*.

5 CONCLUSION AND RECOMMENDATION

Nine fruit fly species namely *B. invadens*, *B*. *cucurbitae* C*. fasciventris, C. cosyra, C. capitata, C. quaniria*, *D. bivittatus* and *D. apoxanthus*were collected using various paraphermones. In all areas studied, C*. fasciventiris* was the dominant fruit fly species.

In the eastern Ethiopia six fruit fly species, (*B. cucurbitae, D. bivittatus, C. capitata, C. cosyra, C. fasciventris*and *C. quinaria)* were reared from mango fruits. Out of the six species C*. fasciventris* appeared to be dominant, followed by *C. cosyra* while *B. cucurbitae,D. bivittatus, C. quinaria* and *C. capitata* in a descending order of their numbers.

Except *B. invadens*, clear relationship between altitude and population density of the fruit flies could not be established probably due to the limited number of locations in the study. *B. inavdens* was recorded only at Error Gota (743-874masl),

which is a low land compared to the other study areas. *C. fasciventris,* which was found in higher numbers, seems to have wider distribution.

Extent of mango infestation varied among the different areas studied and ranged from 21.6 to 35.4%. High level of infestations was recorded in Harari, Babile and Gursum with respective mean infestations of 35.4%, 34.4% and 33.4%, respectively. The lowest infestation was observed in Bedeno although 21.6% of the fruits were damaged by fruit flies.

Mango losses could be higher with the introduction and establishment of B. invadens. There is a need for monitoring ion the distribution of the fruit flies. The use of the management of the fruit flies demands on attractants

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ANALYSE AGRO-ECOLOGIQUE DU BASSIN VERSANT OKORIKO DE TOUI DANS LA COMMUNE DE OUESSE AU BENIN

[AGRO-ECOLOGICAL ANALYZE OF THE AREA CATCHMENT OKORIKO IN THE DISTRICT OF TOUI AT OUESSE IN BENIN]

Jean Bosco Kpatindé VODOUNOU[1] and Odilon AKPO[2]

[1]Université de Parakou, Département de Géographie, BP 123 Parakou, Bénin

[2]Université de Parakou, Bénin

ABSTRACT: The present study related to the agro-ecological analysis of the area catchment Okoriko in the district of Toui at Ouèssè (department of the hills). The degradation of the resources through the operating systems is at the origin of the analysis agro-ecological to understand the evolution of the catchment area. From this analysis, an inventory of the various agricultural activities undertaken by the population of the catchment area was made, an evaluation of the impact of the agricultural activities on the environment is also made. The data processing collected on the ground, made it possible to note that in the area catchment Okoriko, the principal operating systems are : agriculture, fishing, the breeding, and forestry exploitation. Agriculture and the forestry exploitation are the most practised activities and occupy more half of the population. Indeed, more than 67 % of the ecosystems are occupied by agricole lands and nearly 10 % of the population have their activity directed towards the forestry exploitation. Only 21 % of the households undertake activities like the breeding, and fishes it. These activities are factors of pollution water, ground, vegetation, watery fauna.

KEYWORDS: Agriculture, Activity, Agricultural, Ecosystem, Forestry exploitation, Impacts, system.

RESUME: La présente étude a porté sur l'analyse agro-écologique du bassin versant Okoriko de l'arrondissement de Toui dans la commune de Ouèssè (département des collines). La dégradation des ressources à travers les systèmes d'exploitation est à l'origine de l'analyse agro-écologique pour comprendre l'évolution du bassin versant. A partir de cette analyse, un inventaire des différentes activités agricoles menées par la population du bassin versant a été fait, une évaluation de l'impact des activités agricoles sur l'environnement est également faite. Le traitement des informations recueillies sur le terrain, a permis de constater que, dans le bassin versant Okoriko, les principaux systèmes d'exploitation sont : l'agriculture, la pêche, l'élevage, et l'exploitation forestière. L'agriculture et l'exploitation forestière sont les activités les plus pratiquées et occupent plus de la moitié de la population. En effet, plus de 67 % des écosystèmes sont occupés par des terres agricoles et près de 10 % de la population ont leur activité orientée vers l'exploitation forestière. Seulement 21 % environ des ménages mènent des activités comme l'élevage, et la pêche. Ces activités sont facteurs de pollution de l'eau, du sol, de la végétation, de la faune aquatique.

MOTS-CLEFS: Agriculture, Activité, Agricole, Ecosystème, Exploitation forestière, Impacts, système.

1   INTRODUCTION

La dégradation de l'environnement constitue un problème majeur auquel de nombreux pays font face mais les mécanismes qui participent à cette dégradation diffèrent d'un pays à l'autre [1]. Ce phénomène se manifeste dans les pays du Sud par la surexploitation des ressources ligneuses et l'érosion des terres qui, chaque année, conduit à l'abandon de sept (7) millions d'hectares et la disparition de dix (10) millions d'hectares de forêts ombrophiles tropicales [2], [3], [4]. La gestion traditionnelle des terres par la culture itinérante sur brûlis et surtout la non maîtrise des techniques de conservation des sols et de l'eau conduisent à la dégradation de la plupart des terres exondées ayant pour corolaire une baisse de la fertilité des sols et des rendements de plus en plus faible [5]. L'exploitation du bois et la récolte du bois de feu à grande échelle ont contribués à la dégradation des bassins versants ce qui se traduit par le déboisement de nombreux bassins versants fortement détériorés [6]. Outre, l'exploitation du bois d'œuvre et de feu, d'autres activités telles que l'agriculture, le maraîchage et la pêche contribuent également à la détérioration des 'écosystèmes des bassins versants.

Puisque les paysans recherchent des terres bien productives, ils sont obligés d'aller sur d'autres terres encore fertiles. Avec leur richesse naturelle, leur bonne alimentation en eau, les bassins versant font objet d'un intérêt accru dans certaines régions [7]. En effet, les bassins versants offrent une multitude de services aux sociétés humaines. L'alimentation de la planète en eau douce à des fins ménagères, agricoles et industrielles dépend des flux qui sont créés et régulés par les bassins versants. Pour [6] l'agriculture et la sécurité alimentaire sont largement tributaire de l'eau de surface et des sédiments recueillis et transportés par les pentes des bassins versants. De même, les forêts des bassins versants sont une source importante de bois d'œuvre et de feu. De nombreuses communautés rurales dépendent directement des ressources naturelles des bassins versants pour vivre. Vu les avantages qu'offrent les bassins versants sur le plan alimentaire et des revenus des populations riveraines, ces derniers sont soumis à une très forte pression humaine [8].

Cependant, une telle forte pression sur les ressources naturelles ne peut rester sans entraîner la dégradation de celles-ci. L'importance des conséquences de la dégradation de l'environnement suscite une prise de conscience de plus en plus croissante même chez les plus sceptiques de notre planète [9]. La gestion rationnelle des bassins versants devrait non seulement permettre aux populations de subvenir à leur besoins mais aussi et surtout à la protection des ressources des bassins versants [10].

1.1   PRESENTATION DU MILIEU D'ETUDE

Cette recherche s'est déroulée dans l'arrondissement de Toui situé entre 2°20' et 2°45'de longitude Est et 8°33' et 8°46'de latitude Nord. Il est limité au Nord par les arrondissements de Alafiarou, de Goro et de Tchaourou ; au Sud par les arrondissements de Kèmon et de Kilibo ; à l'Ouest par l'arrondissement de Gbanlin et à l'Est par le Nigéria.
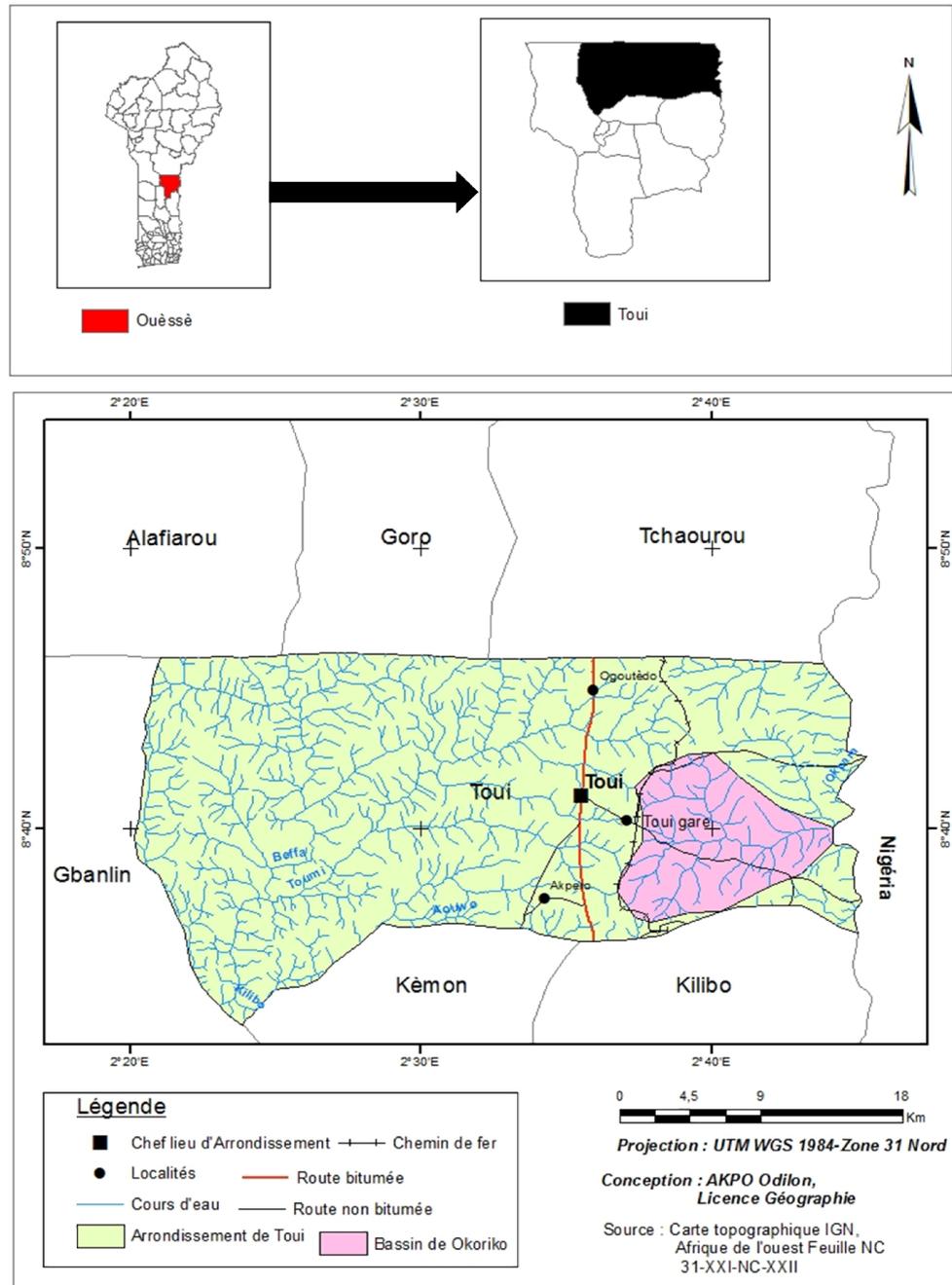
Fig. 1. Localisation du secteur d'étude (bassin Okoriko)

L'arrondissement de Toui comme toutes les autres localités de la commune de Ouèssè, beigne dans un climat de type subéquatorial et celui de type tropical humide. Il appartient donc à une zone de transition climatique tantôt unimodale, tantôt bimodale. Ils y tombent annuellement des pluies de hauteurs variant entre 900 et 1500 mm. Les températures journalières varient de 24°C et 26°C, l'amplitude thermique faible est de 5°C. L'harmattan souffle dans la zone de Décembre à Février. Le mois de Janvier paraît le plus frais, où la température descend jusqu'à 10°C du fait de l'harmattan.

La zone est située sur le socle précambrien, une pénéplaine cristalline de toute la région de la commune de Ouèssè. Ce territoire est déterminé par des collines d'une altitude avoisinant 200 m. Elles essentiellement constituées de roches cristallines et cristallophylliennes. Les faciès les plus courantes sont : le gneiss, le micaschiste, les migmatites, les quartzites et les granites. C'est un continuum de pénéplaine ondulée avec une topographie à faible inclinaison.

Le couvert végétal est fait de savane arborée, arbustive, des galeries forestières et d'une partie de la forêt classé de Tchaourou, Toui et Kilibo. Les espèces de plantation rencontrées sont pour la plupart des tecks et les termilanias. La

recherche des terres fertiles, l'exploitation de bois de chauffage ont contribué à la dégradation de la végétation autrefois constituée des essences comme l'Iroko.

Les sols rencontrés sont de type argileux, hydromorphe et ferrugineux tropical sur socle cristallin aux caractéristiques très variables. Du fait de la présence de la forêt classée Tchaourou- Toui- Kilibo, on note une forte tendance à la réduction des terres disponibles à cause de la forte pression foncière. L'agriculture itinérante sur brûlis est la pratique originelle dans la région. La pression démographique limite quelque peu cette pratique. Le système d'enfouissement des herbes lors du billonnage est très répandu

Le réseau hydrographique est peu important. Les bas-fonds sont mis à contribution pour permettre d'assurer partiellement la couverture des besoins en eau des populations avant l'installation des forages. Au nombre des cours d'eau, on peut citer : la rivière Odo Malou située à quelques kilomètres de Toui-VAP ; la rivière Okoriko de Toui gare qui s'allonge jusqu'à Toui centre. On y trouve également des barrages pour la pêche et les cultures maraîchères. Aujourd'hui, les bas-fonds servent à la culture du riz.

La population de l'arrondissement de Toui est estimée à 15634 habitants dont 7758 de sexe masculin et 7876 de sexe féminin. Le nombre de ménage est évalué à 2229 au recensement général de la population et de l'habitat de 2002. Deux grands ensembles socioculturels et et ethniques cohabitent dans cet arrondissement. Il s'agit des Shabès et des Mahi. A ces deux grands groupes s'ajoutent essentiellement les migrants agricoles provenant des aires culturelles Fon, Otamari, Yom lokpa, d'une part et des éleveurs peuhls sédentaires d'autre part. Aucune ethnie n'a son quartier spécifique

2   MATERIELS ET METHODES

2.1   MATÉRIELS

Les matériels utilisés lors de la collecte des données sont :

- boussole pour la prise d'azimut;
- crayon pour relever des informations ;
- coupe-coupe pour défricher les herbes le long du transect ;
- fiches de description du sol et du paysage pour la description du sol et du paysage;
- GPS pour prendre les coordonnées géographiques des lieux ;
- marqueurs pour numéroter les piquets le long du transect ;
- papier millimétré pour le dessin parcellaire ;
- questionnaire pour recueillir les informations nécessaires pour le travail ;
- tarière pour prélever le sol ;
- clisimètre pour la mesure de la pente ;
- décamètre pour prendre les mesures entre les piquets le long du transect.

2.2   MÉTHODES

2.2.1   LES TRAVAUX DE TERRAIN

L'ouverture de trois (3) layons dont le premier au bas versant, le second au moyen versant et le dernier au haut versant (figure 2). Ensuite, des mesures et observations ont été effectuées le long des transects réalisés. Comme mesure, on peut citer : les mesures altimétriques, les levés parcellaires, l'occupation du sol. Toutes ses mesures ont été complétées par un inventaire botanique et des sondages à la tarière pour une analyse complète. La collecte des données socio-économiques a été faite à travers des enquêtes auprès des ménages, les agents de santé et les chefs de villages
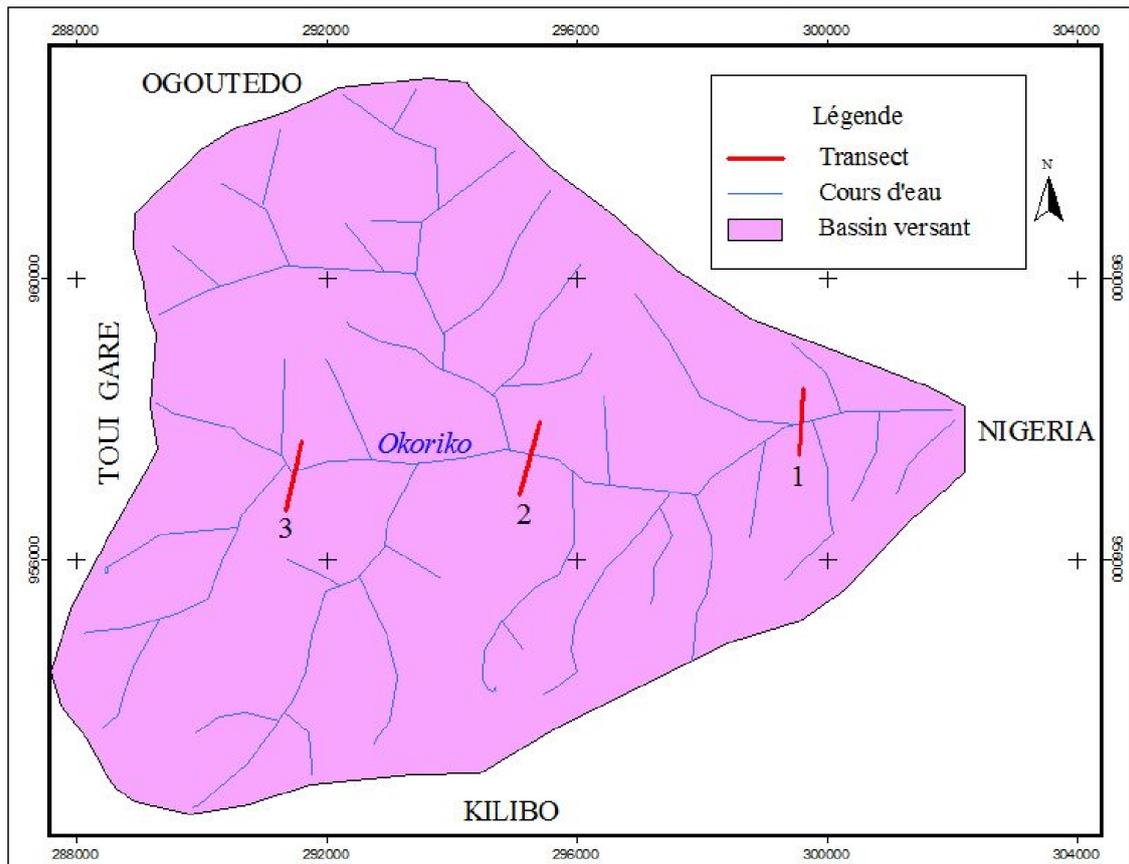
Fig. 2. Répartition des transects réalisés

2.2.2 ANALYSE TOPO-SÉQUENTIELLE

Cette analyse fournit plus de détails par rapport à l'occupation du sol à travers la méthode de transects. Chaque transect est présenté en trois parties :

- la partie notée (a) concerne le découpage morphologique. En effet, le profil topographique est découpé en facettes selon la morphologie du terrain. On distingue les sommets, les hauts de versant, les bas de pente, les dépressions, les zones inondables et les lits de cours d'eau.

-la partie notée (b) intéresse le profil pédologique qui présente les différents points où les sondages à la tarière ont été effectués. Les horizons sont présentés selon leur texture (S=sable, A=argile, L=limon, AS=argilo-sableux, SA=sablo-argileux, SL=sablo- limoneux, et leur drainage.

- en fin, la partie (c) qui concerne le levé parcellaire traduit les différentes formes d'occupations du sol rencontrées le long du transect et sur 50m de part et d'autre de la ligne de transect. Ce dessin prend en compte les formes de végétation (forêt, savane, jachère) et les cultures (annuelles et pérennes). Pour les cultures, une ou deux lettres indiquent la spéculation pratiquée sur la portion concernée. Ainsi, ha : haricot, se : sésame, ma : maïs, ig : igname, ar : arachide.

2.2.3 COLLECTE DES DONNÉES SOCIO-ÉCONOMIQUES

Pour définir la taille de l'échantillon, on a procédé à la détermination des différents villages que prend en compte le cadre d'étude, il s'agit de : Ogoutedo, Toui centre, Toui-Gare et de Toui-Vap. Le nombre de ménages que compte la zone d'étude est évalué à 2229 sur la base des données issues du 4ème Recensement Général de la Population et de l'Habitation de 2013. Ainsi, un quota de 5 % a été appliqué à l'ensemble des ménages proportionnellement réparti par localité ; soient 111 interlocuteurs interviewés. Par village, les questionnaires sont adressés à 30 ménages de différentes catégories socioprofessionnelles. Le choix des ménages a été fait de façon aléatoire. Les enquêtes sont menées sous forme

d'entretiens auprès des ménages. En effet, les questionnaires sont adressés soit au chef de ménage, sa femme, son fils ainé ou toutes autres personnes adultes du ménage pouvant fournir des informations fiables c'est-à-dire des informations relatives aux activités menées dans le bassin et l'impact des activités sur l'environnement et la santé de la population.

2.2.4 TRAITEMENT DES DONNÉES

Les données collectées ont été soumises à deux traitements : le traitement manuel et informatique. Le traitement manuel prend en compte le dépouillement des données brutes collectées sur le terrain et le traitement informatique concerne les données statistiques dont sont issus les graphiques et tableaux réalisés grâce au logiciel Excel; enfin les données cartographiques, composées essentiellement des cartes réalisées grâce au logiciel Arc-View.

3 RESULTATS ET DISCUSSION

3.1 ANALYSE AGROÉCOLOGIQUE DES TRANSECTS

L'analyse des transects est faite suivant la description des différentes unités d'occupation du sol rencontrées le long des transects réalisés. Il s'agit en effet, des aspects physiques et humains de l'occupation des terres.

3.1.1 CAS DU TRANSECT 1 : BASSIN VERSANT INFERIEUR

❖ **Aspects physiques**

Le transect 1 s'étend sur une longueur totale de 575 m. Il est orienté Est-Ouest. Le fond de vallée est très peu encaissé. On distingue :

- à l'Est, un sommet peu élevé avec une pente moyenne de 2 % sur le versant ;
- à l'Ouest, un sommet bas avec un versant presque rectiligne ayant une pente de 1 %

Les sols sont hydromorphes, sableux à l'horizon supérieur. A une profondeur de 0,75 cm, on rencontre des sols sablo-argileux, argilo-sableux puis la roche mère**.**

❖ **Activités humaines**

Le levé parcellaire montre que ce bassin est fortement exploité avec plus de la moitié déjà laissée en jachère. Les cultures annuelles (haricot, sésame, maïs, igname) quant à elles sont pratiquées sur toutes les unités morphologiques et viennent en deuxième position en termes de superficie. Les formations naturelles dont la prairie viennent en dernière position.

Tableau 1 : forme d'occupation du sol en fonction des unités morphologiques du transect 1

Facette topographique	Longueurs (m)	Occupations du sol en ha		
		J	P	CA
Sommet	175	1	0,5	0,5
Bas fond	82	0,5	-	0,06
Versant	293	2	1	0,5
Total	550	3,5	1,5	1,06

Légende : J : Jachère, P : Prairie, CA : Culture annuelles
Source : enquête du terrain, novembre 2013

Le tableau 1 montre que le bassin est fortement exploité avec la jachère qui occupe une grande superficie au niveau du versant soit 2 ha. Les cultures annuelles sont pratiquées sur toutes les facettes topographiques avec une superficie de 0,5 ha sur le sommet ; de 0,06 ha dans le bas-fond et 0,5 ha sur le versant (figure 3).
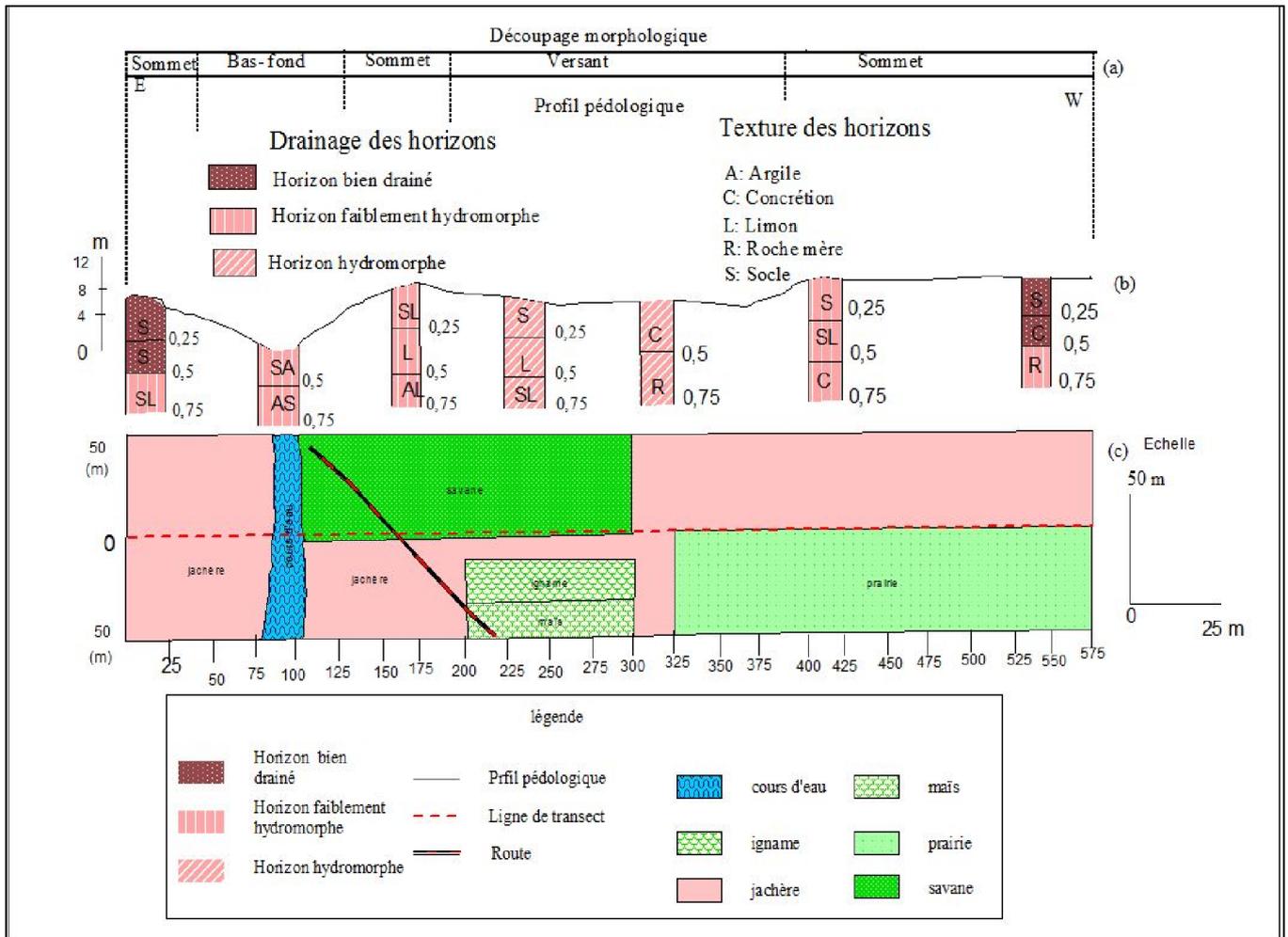
Fig.3. Transect 1 : profil agro-écologique dans le bassin inférieur

La figure 3 montre l'état de l'occupation du sol du bassin inférieur suivant les unités morphologiques

3.1.2   CAS DU TRANSECT 2 : MOYEN BASSIN VERSANT

❖ **Aspects physiques**

Le transect 2 est long de 550 m. Il est orienté Ouest-Est avec un fond de vallée peu profond. Dans les horizons supérieurs, on rencontre des sols sableux et limoneux. A partir de 0,75 cm, la texture devient sablo-argileux, sablo-limoneux avec des concrétions par endroit. On distingue :

* à l'Ouest une croupe dont les pentes sont comprises entre 2 à 3 % avec un versant presque rectiligne ;
* à l'Est un sommet bas avec un versant convexo-concave et une pente moyenne de 3 %.

❖ **Activités humaines**

Le bassin est occupé dans sa plus grande partie par la jachère sur une superficie de 2,7 ha contre une superficie totale de 5,7 ha. Ensuite viennent les formations naturelles avec une superficie de 2,5 ha puis les cultures annuelles (igname et maïs) sur une superficie relativement faible 0,5 ha. Il ressort de cette analyse que ce bassin est moyennement exploité par les populations.

Tableau 2 : Forme d'occupation du sol en fonction des unités morphologiques du transect 2

Facette topographique	Longueurs (m)	Occupation du sol en ha			
		J	CA	S	P
Sommet	312	1,8	-	0,3	1,2
Bas –fond	93	0,5	-	0,2	-
Versant	170	0,4	0,5	0,6	0,2
Total	575	2,7	0,5	1,1	1,4

Légende : S : Savane, J : Jachère, CA : Culture annuelle, P : Prairie
Source : enquête du terrain, novembre 2013

Le tableau 2 montre que les sommets et les versants sont les sites où les activités agricoles sont plus pratiquées. La jachère occupe une superficie de 1,8 ha au sommet tandis que les cultures annuelles occupent 0,5 ha sur les versants. C'est la preuve que les activités agricoles sont plus pratiquées au sommet que sur les versants (figure 4).
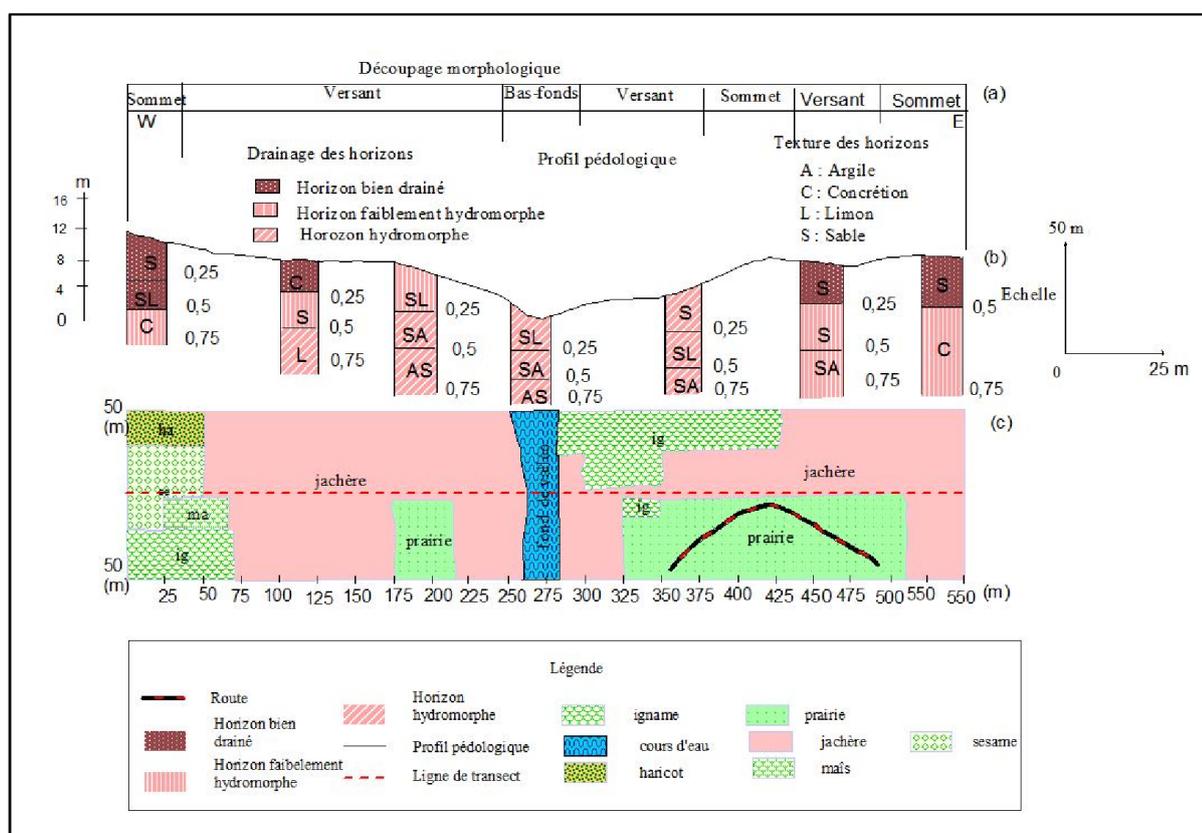

Fig. 4. Transect 2 : profil agro-écologique dans le moyen bassin versant

La figure 4 indique l'organisation de l'espace du bassin moyen au travers des formes d'occupation et d'utilisation.

3.1.3 CAS DU TRANSECT 3 : BASSIN VERSANT SUPERIEUR

❖ **Aspects physiques**

D'une longueur de 525 m, le transect 3 est orienté W-E. On distingue :

- à l'Est, un sommet élevé avec une pente allant de 3 à 4 %, suivi d'un autre versant concave dont la pente est évaluée à 2,5 % ;

- à l'Ouest, le sommet est relativement bas avec un versant ayant une pente de 2 %. Dans les horizons supérieurs et intermédiaires, on rencontre des sols sableux et limoneux. Le niveau inférieur est composé d'argile et de la roche mère.

❖ **Activités Humaines**

Le dessin parcellaire de la figure 5 montre que l'agriculture est la principale activité qui est menée le long du transect. Les cultures annuelles qui sont pratiquées dans ce bassin sont : l'arachide, le sésame et l'igname. La jachère occupe une superficie importante soit 3,8 ha ; Les formations naturelles occupent une superficie négligeable comparativement à l'ensemble des superficies où l'homme est déjà intervenu, c'est la preuve que ce bassin est fortement exploité et par conséquent une surexploitation des ressources du bassin.

Tableau 3 : forme d'occupation du sol en fonction des unités morphologiques du transect 3

Facette topographique	Longueurs (m)	Occupation du sol en ha					
		J	CP	A	FG	S	I
Sommet	80	0,3	0,1	0,6	-	0,2	0,08
Bas fond	232	2	-	-	0,06	-	0,1
Versant	213	1,5	0,2	-	-	-	-
Total	525	3,8	0,3	0,6	0,06	0,2	0,2

Légende : J : Jachère, CP : Champ préparé, A : arachide, FG : Forêt galerie, S : Savane, I : Igname

Source : enquête du terrain, novembre 2013

L'analyse du tableau 3 indique une forte proportion de la jachère dans le bas-fond. Aussi, on constate que cette unité d'occupation du sol a occupée une grande superficie sur toutes les autres unités morphologiques. Les cultures annuelles sont pratiquées le long des sommets (figure 5).
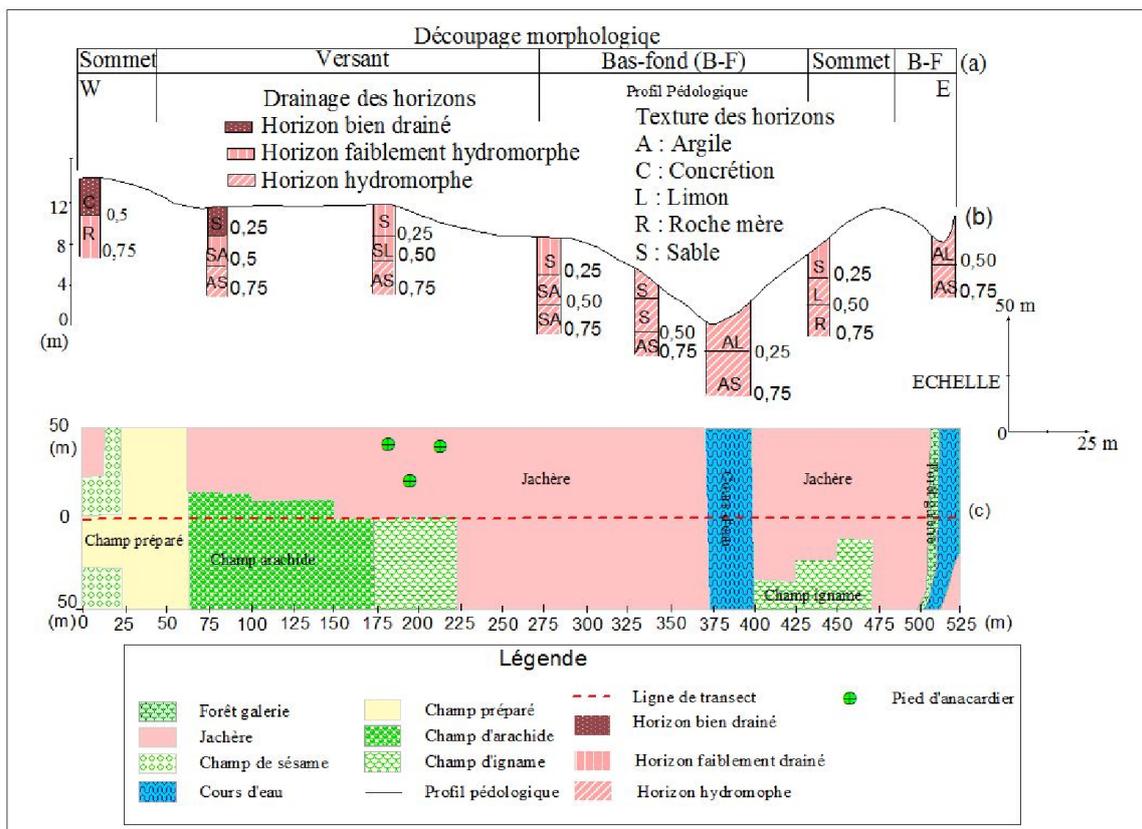

Fig.5. Transect 3 : profil agro-écologique dans le bassin supérieur

La figure 5 montre une répartition des formes d'occupation du sol suivant les unités morphologiques. Ici, on distingue 2 bas-fonds dissymétriques.

3.2   IMPACT DES ACTIVITES AGRICOLES SUR L'ENVIRONNEMENT

La quasi-totalité des activités menées sur le bassin versant sont à l'origine de la pollution de l'eau. Cette pollution est due à la technique de la pêcherie traditionnelle qui consiste à l'usage de produits toxiques déversés dans le cours d'eau. L'augmentation de la charge turbide des eaux de ruissellement liée au remaniement des sols à cause d'une agriculture itinérante sur brûlis. Cette dégradation du bassin dont les causes sont en partie d'ordre anthropique, affectent négativement la rivière Okoriko. Pour près de 70 % de la population interrogée, la rivière Okoriko se comble d'année en année et les ressources halieutiques se raréfient de saison en saison (figure 6).
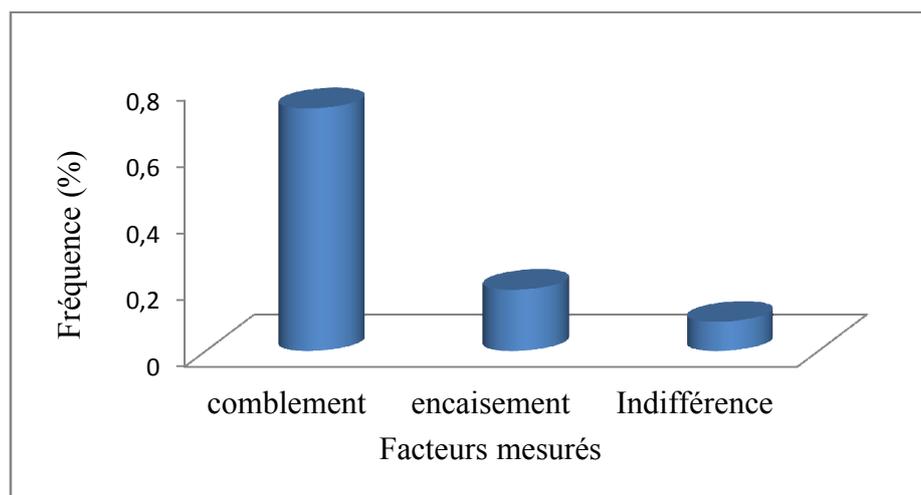

Fig.6. Constats exprimés par les populations riveraines

Source : enquête du terrain, novembre 2013

Dans le secteur d'étude l'agriculture extensive est très prononcée, la permanence de la transhumance et la déforestation anarchique dans le bassin versant sont à l'origine de sa fragilité, d'où une forte érosion ayant pour corollaire le drainage du sable de l'amont vers l'aval. La figure 6 présente l'évolution de la profondeur de la rivière Okoriko suite aux différentes activités qui sont pratiquées le long de celle-ci. On constate donc que le taux de comblement soit 80 % est largement supérieur aux taux d'encaissement et d'indifférence.

Les activités pratiquées dans le bassin dégradent fortement le sol à travers son érosion, sa pollution par les pesticides et sa mise à nu par la destruction de la végétation. La conséquence est qu'il y a perte de diversité biologique, baisse de rendement agricole et disparition d'espèces végétales comme animale (figure 7).
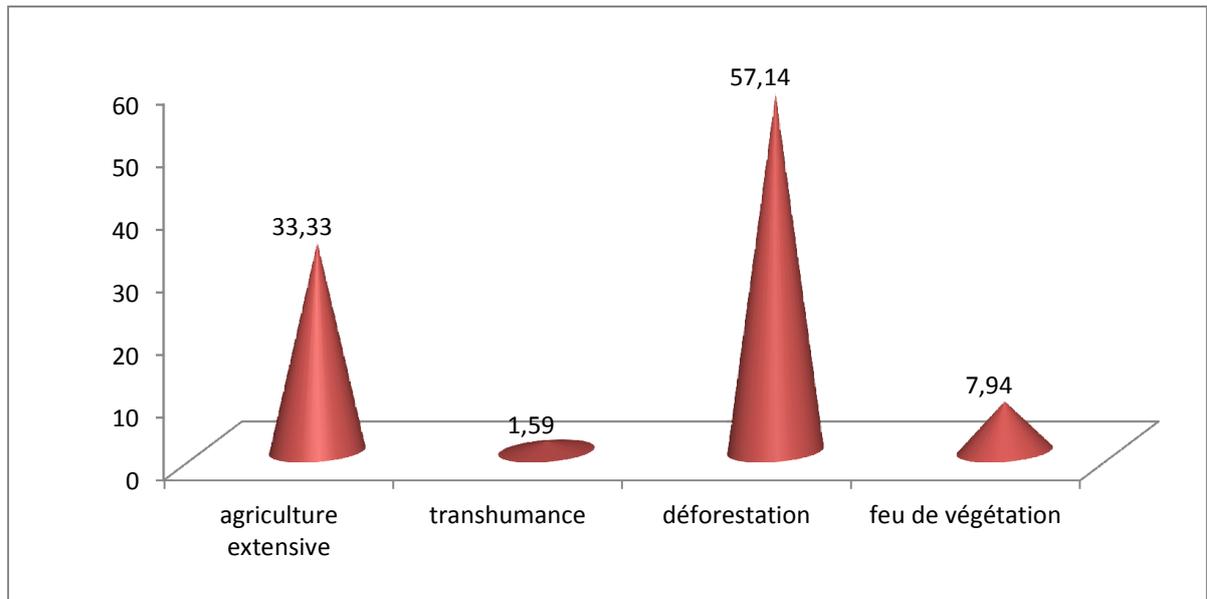
Fig.7 : Causes potentielles de régression de la végétation et de la faune

Source : enquête du terrain, novembre 2013

La figure 7 présente les différentes activités qui sont à la base de la régression de la végétation et de la disparition des animaux. La déforestation est donc la première cause, ensuite vient l'agriculture, les feux de végétation puis la transhumance.

3.3   DISCUSSION

Les différentes activités agricoles qui sont menées dans le bassin génèrent des effets qui se répercutent sur l'environnement. Ces activités sont la cause des graves conséquences sur l'écosystème du bassin. Ces observations ont été faites par [10] en 2010 lors de ses recherches sur le bassin de la Sô et qui conclue que l'identification des impacts aussi bien négatifs que positifs attribuables aux systèmes d'exploitation est basée sur l'analyse des effets résultants des interactions entre le milieu touché et les équipements utilisés ou les activités réalisées.

En effet, L'agriculture extensive très prononcée, la permanence de la transhumance et la déforestation anarchique sur le bassin Okoriko sont à l'origine de la fragilité de l'écosystème du bassin. Ces activités impactent négativement non seulement le milieu physique qui est composé de l'eau et du sol mais aussi le milieu biologique. Les mêmes résultats ont été trouvés par [11] lors de ces travaux sur les bassins versants. A la fin de ces recherches, l'auteur aboutit à la conclusion selon laquelle les causes fondamentales de la dégradation des sols d'un bassin versant sont le déboisement anarchique, l'agriculture et le surpâturage. Il en est de même pour [12], qui concluent que les zones humides ont perdu beaucoup de leurs caractéristiques, principalement la perte de biodiversité ainsi que la perte des performances de leurs fonctions ; ceci est dû majoritairement à l'intensification agricole qui résulte du besoin d'accroître la productivité afin de nourrir la population qui ne cesse d'augmenter. [6] obtient les mêmes résultats lorsqu'elle fait observer que l'exploitation du bois d'œuvre et la récolte de bois de feu à grande échelle ont contribués à la dégradation des bassins versants.

4   CONCLUSION

Les travaux de cette recherche ont permis d'identifier plusieurs activités agricoles qui sont pratiquées sur ce bassin. Au nombre de celles-ci, on peut énumérer : l'agriculture, l'exploitation forestière, la pèche et l'élevage. Les instruments utilisés pour ces différentes activités étant de nature archaïque, l'équilibre entre le sol, l'eau et la végétation est rompu. Ce déséquilibre entre le sol, l'eau et la végétation est responsable des effets négatifs observés sur les écosystèmes du bassin. Ces effets négatifs touchent les composantes environnementales du bassin (milieu physique, le milieu biologique et même le milieu humain) et par ricochet entraîne la dégradation des ressources du bassin. Ainsi, on assiste à la pollution de l'eau et du sol, à l'augmentation de la charge turbide des eaux de ruissellement, à la destruction des terres arables, à l'érosion des sols

mis à nus, à la perte de la biodiversité, à la baisse de la richesse spécifique des essences forestières et à la régression des rendement aquacoles.

Vu l'explosion démographique dont la plupart des communes du Bénin en général et en particulier la commune de Ouèssè est confrontée, il s'avère indispensable de mettre sur pied de nouvelles méthodes de gestion des bassins afin de ralentir voire remédier à la destruction des écosystèmes de ces derniers.

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Traditional chiefs and decentralization in the region of Tahoua in Niger

Aboubacar ZAKARI

Department of Sociology, University of Zinder, Niger

ABSTRACT: This paper discusses the relationship between the traditional chief in Niger together with the process of decentralization. The democratic process initiated in the early 90s in most of the African countries helped to establish a multi – party system as well as kept good government structures. The initiative could solve the excessive centralization of government powers in African countries. In order to understand the decentralization process in Niger, we should not only refer to the democratic context but also we should understand certain historical facts. Besides, the context of democracy, it should be noted that the claims of the armed rebellion (1989) based on federalism have led to peace agreements, in the October 9, 1994 and April 24, 1995 between the organization of armed resistance (ORA) and the Government of Niger, to adopt decentralization as a form of governance. The option is a full communalisation by changing the townships (sedentary and area nomadic) in commune status. The communes are headed by an elected mayor. The logic is to make these structures as real poles of local development. But in the same way and during a long time at the head of same township there is a leader who administered his people according to traditional mode. This two kind of powerful can create a social conflict if some rules are not defined. I am interested to region of Tahoua, particularly the two urban communes.

KEYWORDS: Decentralization, municipality, Local government, Traditional Chief, urban commune.

1 INTRODUCTION

Since the independence of Niger, each government needs to involve the population achievements development. From Diori Hamani, Niger's first president - 1960 the August 03 to April 15, 1974- to now, each one tried to organize the people in the national development process. Although, the contents of the mobilization

and approach differ from one system to another, it leads to the same result: the ability to organize local people within the structures of their own where they can decide about their own affairs but according to the logic of administrative supervision.

This kind of organisation was named decentralization. But it is important to note that despite the ambition engaged by both of political authorities since the independence; the implementation of decentralization has been taking a long time. The five successive constitutions have all endorsed the principle.

The option chosen by the government with the help of donors is communalisation. The Niger territory is divided into 266 municipalities, (Law No. 2002/012 of 11 June 2002 which determines the basic principles of the free administration of regions, departments and communes). This division was based on custom entity, the township which has itself been divided geographically by a number of villages. On the basis was held the election of the 266 communes on July 24, 2004, officially proclaimed by the Constitutional Court on August 5, 2004. This act is the recognition of new communes by citizens. But the implementation of the process provokes reactions and protests as noted ZANGAOU Moussa "these reactions are both positive and negative. They relate to all people leaving the region. (....) Heads are, in the districts, very active in these series of challenges. "

In this paper, we try to understand, what has happened according to the relationship between traditional authorities and new mayors in the Region of Tahoua particularly in the urban commune. Which solution could find different actors?

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2   A PROBLEM

Most African states, since the early of the 1990 years, were engaged in institutional reform including decentralization because "*the initiative and the implementation of these reforms are based on a number of assumptions relating to the nature and the function of postcolonial states*"(Elsa ,2003). They are supposed to perform all the functions devolved to them but apparently their centralized management is a barrier as noted by Albert TEVODJRE, "*a centralized state has a heavy bureaucracy which annihilates any initiative at the base*" (TEVODJRE, 1978). But for Kadre Desire OUEDRAGO, we should look about the context of the birth of the African state. Because he said that "*the African state is the product of a double misunderstanding, a state built on the basis of ulterior thoughts*" (OUEDRAGO, 2001). According to the synthesis of these theories we understand that the African state refers not only to its past history, i.e. the time of kingdoms but also its contact with the colonization system. Then Kadre Desire OUEDRAGO concludes that "*ultimately, none could annihilate each other, and the post-colonial African state continues to coexist with the colonial legacy and the traditional*" (OUEDRAGO, 2001). That is why this misunderstanding of the essence of the African state which partly explains its central character that blocks any development initiative at the local level. In this case, the aim of decentralization is to correct this problem and to include the African state as Niger's country in the concert of developed nations**.**

In Niger, the implementation of decentralization process does not only point to the above mentioned fact but also in its relation to certain historical facts. *The macro sociological (*OUEDRAGO,2001*)* context is marked by the political pluralism opened by the speech of the Baule with the holding of the Sovereign National Conference and the claim of the armed rebellion in the northern part of Niger where uranium and other natural resources are operated based on federal arrangement. This claim has led to peace agreements, on 9 October 1994 and 24 April 1995 between the organization of the Resistance Army (ORA) and the Government of Niger, which state that the Republic of Niger is divided into administrative districts which are Region, Department, District and commune (High Commissioner for administrative reform and decentralization, Final Report on the administrative division of the Republic of Niger, in January 1996).

Since then, the Niger government, with the support of donors, has being working in creating communes. Proposals and laws were adopted and promulgated culminating with the holding of municipal elections on the 24 July 2004. "*The legislative framework of this administrative reform is based on the communalization of all the headquarters of cantons (fee the customary chiefs sedentary) and certain groups (nomads)" (*HAHOUNOU, 2002*).*

In this case, the Law 2002/012 of 11 June 2002 is the reference of this reform which determines the fundamental principles of free administration of regions, counties and municipalities taking into account the administrative authority that characterizes the state of Niger. However at the present time, the scheme only applies to the municipal level with the creation of 266 municipalities including 52 urban and 214 rural, each with a headed by a mayor who chairs the council. "*The aim is to transfer the decision-making powers of the central government to local level*" (HAHOUNOU, 2002). The objective is to promote good governance at local level. This approach is called the normative theories of decentralization. According to this view; "*decentralization could be considered as a necessary condition for improving the planning and implementation of development"* (OUEDRAGO, 2001). But if we observe the various theories involved, you realize of course that it is diffusion. This character of diffusions postulates that the progress realized in modern societies (western) must extend in the society through a process of diffusion of consumer products, technology, mode of behaviour, short of the institutions. But when you observe at a practical level, you realize of course that the different reaction of the component of the Niger society is a source of concern for a success of the process. Four years later, the decentralization in Niger which is consider being a transfer of skills and resources from central level of the state to municipalities, is akin "*to a transfer of a pyramid of problems"(*ADJI,2008*)*. Elected people and citizens of the 266 municipalities in the country cannot become familiar with the process. The reform coupled with the administrative division, citizen can't distinguish the electoral circumscription with the local collectivity. The communes of Tahoua are not an exception to the rule. In this case, Zangaou Moussa, citing Nahiou Mamoudou, reported that "*in the congress, representatives of traditional chiefs have called this process of decentralization and a hasty readjustment of communalisation unbridled.*" *At the same meeting, some from the region of Tahoua nomadic dominance has even rejected all the results of the redistricting commission* (ZANGAOU, 2002).

In the same way, in order to find a response to decentralization system particularly in its disruption of the existing system, civil society via the association of pastures from the north region of Tahoua have queried about impacts of communalization on the lifestyle and the natural areas of the pastures. By the fact, pastoralism and communalization evoked two opposite systems of social organization, which are economic and political respectively. Communalization will create two problems for transhumant pastoralists:

- The redefinition of their space of belonging
- Investment and other subsidies for the State in the context of the communalization.

Only the determination of legal rules will resolve this problem which generates reactions, because for nomads the space is open and infinite. It is clearly there are some problems in the implementation of the decentralization process which must be analyse. The traditional chief want to conserve their powerful but the new mayors should work about modern logic according to the supervision authority. In this case how to harmonise the different views?

3 METHODOLOGY

In order to make an analytical study, we firstly conduct a review of literature, identify the main concepts in the second part, in the third part the aims and the objectives of the study. Finally, we made an analysis of a confrontation with a duality of power in administrative entity as Tahoua before to make a State of Place about this reform.

4 REVIEW OF LITERATURE

In the implementation of development programs of African countries including Niger, governments have adopted mechanisms for development according to the situation of the moment (from the proclamation of the republic to now). Capitalist or socialist programs through structural adjustment program, they managed to achieve decentralization as a way of managing the local power by creating databases of a national development. But between theory and practice, there are steps to be crossed. It never once crossed would make the wish. Precisely, in this step, an extensive literature exists for this purpose. We shall do the synthesis of the latter in order to identify the theories involved. Thus, our literature review is structured around the following central themes:

- Decentralization and democracy;
- Decentralization and development;
- Decentralization and the socio-historical

Decentralization and Democracy

Speaking about of the relationship between decentralization and democracy, Jean POIRIER, (2001), note that decentralization policies have occurred one or two decades are presented as a more democratic because it is actually a consequence of the serious deficiencies that represent all the schemes Democracy in the West because they are too often unaware of the specifics and values of African societies. The author focuses on a particular aspect. Whoever is to consider the socio-economic development of Africa in the implementation of decentralization? For him, if the content is not appropriate to the context, needs and specific potential of society to decentralize, it is likely to become an additional element of instability, or simply be unnecessary. This overcomes a concept of decentralization Universalist improperly or functionalist. The interest of this study lies in the fact that it not only refers the decentralization in a democratic context, but also recommended to take account of specific society to decentralize.

Rene OTAYECK, (1999), meanwhile, in a study on "democracy protests between identity and state needs. There is there an "African exception? »Asks about the crucial question in relation to decentralization in Africa. He said the decentralization of the state, it means the divestiture of the center of its regulatory functions and distribution, and transfer of certain powers of the most crucial, according to the credo of donors funds, represent a major strand of the institutional reconstruction of the State in Africa?

For this author, is certainly required but decentralize state must remain a strong state because civil society has not reached a high degree of maturity, but also it is a great risk of leaving the management to fully local officials inadequately prepared for the tasks of command.

The analysis is interesting by the fact that the reform to be successful must be supported by an awakened civil society and local officials can ensure that their work. It is not the case in Niger because the country that has just begun the experience in 2004. Nevertheless, the game is worth the candle. But the term "strong state" should not encroach on the part of the administrative supervision because it must remain the reference in the conduct of any administrative action.

All these authors make their analysis according to the relationship between democracy and democracy. Certainly it must have a democratic system in order to claim a local election (which does not exist in states of emergency) but they do not show how democracy should strengthen decentralization at the base. Therefore with regard to democratic progress in African countries must emphasize the need to involve local people in managing state affairs. Involve local people requires the involvement of this important population in our countries in the development process through appropriate institutional mechanisms. To this reflection, we must add those about the relation between decentralization and development

Decentralization and development

Dele Olowu, (2001), after having identified the three major steps that have characterized the decentralization shows that only a polycentric government is likely to promote decentralization. In this perspective, it reveals that decentralization is linked to the ability to consolidate the socio-economic ties within local communities witch have a defined territorial basis. His study concludes by noting that development, democracy and decentralization are linked because the development in the context of decentralization is seen as expanding the economic and social democracy. This study are interested for our paper because, it emphasizes the fact that decentralization is to consider the initiatives of local people to recognize their rights to use resources which would enable them to participate in defining and implementation of development policies. In another sense, Albert TEVODJERE, (1978) shows that decentralization is intended firstly to provide communities with basic villagers, for example, full power to ensure all issues of local interest. He further notes that the municipalities as basic units for planning contribute to the development and implementation of the strategy development and regionalization plan. This study is also interested in the sense that the author places the local people especially women as actors for local development.

All these authors consider decentralization as an engine of local development, but they do not really show how local people really need to be involved in the process of development.

According to the connotations given to development in our societies, we must simultaneously placing decentralization in the development perspective to redefine the meaning of the conception of development. It will not be question about approach distance of local cultures in the development process. It must be adopted in our societies, an alternative approach that places in a central position the cultural environment, whether the city or village and focuses on individuals and their participation. Ultimately, it is through in the implementation of local development, to know who can answer the following questions. Who should be asking? What are the unconditional positive, negative fans, and intermediaries? Consideration of this principle is fundamental to the success of decentralization in our states but not enough. It should be completed by the contribution according to the relation between decentralization and the socio-historical values.

Decentralization and the socio-historical values

According to this relationship, Jean GUILLEMIN, (1984), notes that rural areas which represent in most cases more than 80% of the population of African states in the south of the Sahara remain attached to their tradition. By education and tradition, rural structures respect traditional customary. For this population, the modern administration issue from the settlement is mostly abstract and it is difficult for us to understand it. But, the traditional chief collaborator of t this administration appears to them not only more accessible but also better able to understand their particular problems because they are familiarly with them. This study is interested in the sense that it focuses on the reaction of rural population face to modern structures.

This reaction proves that any reform on the environment must reflect this balance of power. In addition to this reflection, MALAM Souley (1984), in a study of political sociology of Touareg in Niger shows that local elites have a real power; their subjects are still with them especially they represent the tradition and they know about people situation. This study is interesting by the fact it encourage to respects not only the role of local elites in Niger but also it explain the role of values to be respected when a State engaged reforms in the direction of the local population.

In conclusion, Eric Komlavi, Hahonou, in a study of traditional leaders and the decentralization project in a west locality of Niger, stresses the importance of traditional authorities in their subject but also how they are rehabilitated meet new reforms. He also note that the leaders are brokers institutionalized for the government and para public one. For him, to access to justice is a good example of the strategic position occupied by the leadership in resolving internal affairs. He tells us a fact that he was told..... *For example if stolen made by someone, the victim cannot come directly go to the police station to complain. He will go to his chief. The other sends it to the cluster head. ... The cluster head will touch the competent authority.... Nomad does not come directly to the administration or the gendarmerie. He always has a support.... Through is the guide. He is indispensable..... He knows the administration even if he has not done school.*

This example emphasized the antagonism between the leaders and their citizens, because for him in order to make affair easy, it becomes complicated. He concluded by saying that despite the redistribution of the political, traditional leaders have in the local arenas central and hegemonic positions of power that, they do not intend to lose. The interest of this study is that it places the traditional authorities in their area in a strategic position.

It is clearly that, these authors in their analyze are favorable to respect the traditional authorities and local people reactions according to any reform, but we insist that any reform, any action towards the public must take account of socio-

historical values, because developers cannot get away with the entire arsenal of a socio-cultural society in order to impose their own vision of development. So, decentralization must respect its values because it has a lot of issues.

A quick overview of these writings reveals that decentralization as an institutional reform is depend on a democratic system and has provoke reactions. For the political (government-developers-donors), it is to promote a new dynamic in the management of state affairs by empowering local people. But according to our analysis, we claim that the success of such reform must not only be within a democratic context, but also the logic of developers must not supplant the local realities. We need the feedback and social values are taken into consideration so that development does not remain as advocated in its theoretical context, but a reality because the government rarely takes into account the cultural factor when developing policy. Because cultural mix that characterizes Africa; various factors including religious, linguistic, cultural and social concerns should be taken into account when drafting the general policy of the government. This can be done by allowing local people to have their own local representatives who would serve as their liaison with the central government.

This is what can be learning about our literature review. In order to situate our study, we must identify the main concepts because it is very important to understand, what we want to do.

5   CONCEPTUAL APPROACH

Decentralization

The concept of decentralization has been the subject of much analysis. Several authors have attempted to define the concept. In the Concise Oxford Dictionary (1983), Decentralization is defined as an act of decentralizing some powers to local communities, spread across an entire country governments, industries, organizations, etc.., which were grouped into a same direction. This is a nominal definition. It does not allow us to characterize the concept of decentralization, because decentralization is a multidimensional process. Some kinds of typologies have been developed by researchers.

The first typology established by Rondinelli in 1981 and repeated in all studies of the 1980s, distinguished between the concepts of decentralization, delegation, devolution and privatization. In 1995, Parker adopted the typology of Rondinelli and proposes to reduce to 3 the concepts included from the concept of "decentralization". First, it excludes privatization defined as the transfer to the private sector tasks formerly carried out by the state, partly because it involves a transfer of decisions outside of public systems and, secondly, because private enterprises newly competent in size Large in Africa. Secondly, it excludes the functional delegation to others agencies apart government since it was rarely initiated or when it was, fail to facilitate the implementation of a real transfer of decision making. Therefore, the three forms of decentralization used are: administrative decentralization, and fiscal policy.

The Township

A township is the traditional socio-political organization that prevailed at the base in Niger since the days of the kingdoms. It includes a number of villages and a population in a located area like Tahoua for example. It is administer by a traditional chief. This chief have a court composed of notable, griot, wise men, which help him to accomplish his mission and the mode of succession is by lineage. The traditional chief has a reputation indisputable from his population level which worships responding to the virtues of ancient traditions. But now this township is transformed as a commune with elected mayor. So that, there are some problems which must be analysed in this study.

6   AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to relate the different position of actors involved in the process of decentralisation in the region of Tahoua, particularly in the two urban communes. About the objectives, we try to improve how to harmonize the different views according to the administrative supervision because our reference in this study is ideal bureaucracy for Max Weber and the role of social values from Raogo Antoine Sawadogo.

7   GEOGRAPHICAL CONTEXT AND HUMAN

Presentation of Niger

Niger is a landlocked country in Western part of Africa, sharing border with Nigeria and Benin to the south, with Mali and Burkina Faso to the west, with Algeria and Libya to the north and Chad to the east. Niger is the largest nation in West Africa with an area of about 1,267,000 km2; also, the population of Niger is estimated at about 15,000,000.

Niger is divided into 7 regions and a capital district, Niamey; the regions are subdivided into 36 departments. As of 2006 the 36 departments are splitted into 266 communes. There are 52 communes' urbaines (urban communes) and 214 communes' rurales (rural communes) according to the local elections which take place on 24 July 2004 and were the starting point of decentralization. But between theory and practice, there are realities to be taken into account according to the several logics.

The Region of Tahoua

General Data

As we said, this study, related the relations with characterize traditional chiefs with the new mayors in the decentralization process. It should be noted that part of the region of Tahoua is composed with 8 departments, 9 urban communes and 32 rural communes (*cf. Acts 2002-014/2002-015/2002-016 of 11 June 2002 and the laws 98-30 / 98-031 of September 14, 1998*).

The Metropolitan Tahoua is located in the heart of the Republic of Niger in the region whose name it bears. It is distant some 550 km from the capital Niamey. Covering an area whose radius varies between 10 and 19 km, the Metropolitan Tahoua has a population estimated in 2009 to 73,002 habitants. This population, mainly composed of agro-pastoralists is distributed in 20 districts in urban areas and 7 administrative villages, and semi urban.

Organizational context and Institutional

The Metropolitan Tahoua is one of four (4) urban communities in the country. It is established by law 98 32 and 2002-016 establishing the organization and functioning.

After the local elections held on June 24, 2004, installation of new elected authorities intervened in February 2005. The Metropolitan Tahoua is composed of two (2) urban municipalities. Each municipality has an urban council chaired by the mayor assisted by two (2) members elected from the councillors. Metropolitan Tahoua headquartered housed the town hall also has a council consisting of fifteen (15) and four councillors elected law councillors (2 representatives of traditional chiefs and 2 national deputies). This council is the governing of the urban community. It is headed by a president supported by two (2) Vice Presidents, all elected from among the managing directors of two (2) urban communes.

The chairman of the Metropolitan Tahoua's mission is to conduct municipal politics therefore responsible for implementing council decisions municipal. He relies on municipal services (ninety (84) agents including six (6) frames), the decentralized services, civil society and traditional leaders to implement development programs and daily management of the municipality.

But in this new administration, we should note that in this town coexists a traditional power whose origin dates back to the settlement of the area.

The Traditional Chiefs

About the settlement of the town of Tahoua and installation of traditional leaders, we can consider the statement of Mr. Abdul Ouhou Dodo, currently Chairman of the Metropolitan on his interview by Issaka Saidou from Sahel newspaper of Sunday n°1335, which is a Niger weekly, 10 April 2009, saying that around the 17th century that two groups of hunters created what later became the city of Tahoua.

These two groups of hunters are Fakaoua to east and west Bilbissaoua. In those days, Tahoua was a collection of huts of hunters and farming hamlets. Heads of Tahoua were called "Maggagi" (meaning mayor). They were assisted in their duties by a council of elders composed of a priestess and seven (7) officials. The first "Maggagi" of Tahoua was Gardo Dari.

Around 1674, all the principalities of the Tahoua region fell under the tutelage of Sarkin Darey (regional supreme authority), against Aggaba. And it is from this time that the region took the name of Ader. Illéla is capital in 1733. It would be headed by a'''"Maggagi enjoying a relative autonomy. The supreme power was exercised by Illéla will now proceed with the appointment of "Maggagi" Tahoua. In 1900, the colonial administration moved to Tahoua. It is going to build the city into a township and the first Chief was Tankari. From the beginning of the twentieth century is the dynasty of Salifou Galabi will be the primary holder of the throne. Since then several leaders have succeeded at the head of the chiefdom of Tahoua, who's current Mahamadou Elhadj Moussa, who took over in 2007. The current chief, Moussa Elhadj Mahamadou is assisted in his duties by the local chiefs and village chiefs.

It must be remembered; in general the traditional chief in Niger has been regulated since independence. It is regulated by the Law No. 64-23 of July 17, 1964, establishing administrative districts and local governments and modifying texts and subsequent Ordinance No. 93-28 of 30 March 1993 on the status of traditional chiefs of the Niger which makes her as a

collaborator of Niger administration. But with the decentralization process, observers agree that, this role has to be replaced by the presence of a municipal council at the county level which is converted into commune.

This duality of power could be a source of conflict as a conflict of culture (democratic culture -succession by lineage)? How about interaction in a society undergoing democratization?

8   ANALYSIS OF A CONFRONTATION WITH A DUALITY OF POWER IN ADMINISTRATIVE ENTITY

Decentralisation and traditional authorities' reaction

The implementation of decentralization in Niger has been marked by various reactions including from some Niger actors in society in general and particularly in the urban commune of Tahoua. If in other localities (Bankillare in western Niger, for example) reactions relate to challenges about the location of the town at the Metropolitan Tahoua, we try to understand their reaction according to the new reform because they have strategic position in Niger society as an institution of government in Niger. What can we learn about?

The answer to this question is related first to the history of the chief and second to social considerations. In Niger, Souleymane ABBA note, *"the traditional leadership is a key institution in the power structure of pre-colonial administration"* (ABBA, 1990) .This means that the leadership was in business before the arrival of settlers. With this arrival, it was used in performing the work as auxiliaries of the colonial administration and benefit with advantage about their function.

 Also, in this sense, Salifou ANDRE notes that "the chief is the representative, the running of the administrative authority; he is the only representative and accountable to the community over which he is placed". (ANDRE, 1989). The role and place of these authorities did not profoundly changed even with the attainment of political independence so that the different authorities which govern them have been adopted texts in order to regulate them. Souleymane ABBA qualifies them as *"a''political issues''and''an electoral machine,''because for him, "being in good terms with it, you win any election."*(ABBA, 1990). A simple fact of political life in Niger shows that all regimes have used. Currently, traditional chiefs are governed by the constitution of October 31, 2010 which defines the status of the traditional chiefs of the regulations implementing this order and ministerial orders.

This brief history of our traditional leadership proves that the reaction of these authorities is a sense to maintain their power begun since long time. The existence of the elected mayor may appear as a kind of duality of power in any entity and can be detrimental to the symbolism that the leader in its area of governance. In this case, we can talk about of a malfunction occurred in a system established since pre-colonial times. For example in the two townships of the urban community of Tahoua, traditional leaders are responsible for collecting the poll tax which is 700 CFA francs ($ 1.4) per person taxed in their locality over the collection of taxes on the steps insured by their relatives. By making an accumulation with the number of the total population and the rate of poll tax in the two cantons, the two traditional authorities could collect annually for example around 51,101,400 CFA francs ($ 102,202).

By doing that, they are entitled to material and social benefits as provided by sections 26, 27,28,29,30 of Ordinance No. 93-028 of 30 March 1993 according to the status of traditional chiefs in Niger. Others social benefit witch are no less important that, for any conflict between the villagers within the township must spend in court before the Chief of referring to an administrative authority (police or justice) and even in the case, we must go before an administrative authority, belligerents will be accompanied by representatives of the traditional authority .

Also, the movement of these traditional authorities in the villages forming areas of the township are celebrated with pomp by the local people. It is clearly that the desire to elect a mayor in such a situation even if it is according to logic of development its presence might be likened to a dualism and a disruption of an old order. Although with decentralization, traditional chiefs is a member of law in the advisory council, the new mayors should know how to work with her because despite the vicissitudes of recent history, the traditional chief remains as a social institution and a living symbol because with the persistence of certain cultural values at the same time it is the repository of customary authority. In addition there are local populations' reactions.

Decentralization and popular reactions

Apart the reaction of traditional authorities, those of the local population, civil society, political parties and others in the region will enrich the debate on the decentralization process initiated by the political authorities with the support of donors. These reactions show the societal logic that characterizes many Niger villages. It should be noted that because natural boundaries, many villages located on the border of several townships, have been limited arbitrary.

What effect the erection of some villages in communes in favour of others in the eyes of local people does not deserve. This is due to a logic linked to the history and prestige of our various villages. For local people, although "local governments are created by law", the decentralized state must take into account certain socio-historical values to the risk of creating"phantom"communes. These considerations are in a logic for people to support their leader because beyond partisan of these considerations, it should be noted that this is related to a sub same information on issues of decentralization, which have risen further.

By the fact that it takes place on the 1267000 km², decentralization coupled with redistricting, comes as a new reform so that many in the urban community of Tahoua who confuse with the local authority constituency. Is it merely a sub information or can we speak of a lack of civic education in the population level? The response may be tempered because even if the rate of illiteracy is high in the region (75%) and (25%) for the enrolment rate of the reaction function of these populations is that the policy gives meaning to his action. In the same way, that is to say in response to decentralization including the appearance of disorganization in the existing system, civil society via the association of pastors of the Metropolitan (North) asked compared to the impact of communalisation on lifestyle, natural areas of these pastors. By the fact that pastoralist and communalisation evoke two systems of social organization, economic and political opposites, communalization will pose two problems for transhumant herders: the redefinition of their space of belonging and that of investment and other subsidies the state in the context of the communalisation. Only a definition of legal rules will resolve this problem, which arouses so many reactions because for the pastors, the space is open and infinite. In this sense, the responsibility of the government is engaged. Aware that the hydraulics, education and health are the three elements of rural concerns, these executives are wondering whether the state can really help all people or it will be a management of variable geometry, the rulers' priorities areas that are favorable to them because you are in a democratic context.

It is clear from the foregoing that although the logic of the developers (state donors) reflects the fact that empowers local people to be sovereign in their development, the reactions of these people are numerous. These reactions show how these people could be heard because their socio-economic and policy are going to be taken into account. Despite all this reactions, municipal elections were held on July 24, 2004. What inventory do you do?

9   A STATE OF PLACE

The first municipal elections were held in July 24, 2004. The independent electoral commission announced the results of 3747 seats to be filled for all 265 municipalities gave the turnout, which is 43.56% against an abstention rate of 56.37%. The main idea that we can remember is that these elections mark a specially point for political and social history of our country. Indeed, with the organization of these elections, it ended a system of appointment of managing directors who prevailed. They are now elected and could possibly be removed by the local population through counsel if perjury. Because, there is the presence of two authorities on the same administrative entity of which one obeys the logic of democracy is i.e. after an election and the other has the logic of succession by lineage. By this company is to manage our modern local government defined as a human grouping geographically located on a portion of the national territory with power to administer by the elected authorities. It enjoys legal personality and financial autonomy. They come from different cantons, or groups of Niger. This logic would infuse dynamism in the various actors. In other words, the organization and establishment of new municipalities and the local implementation of welfare depends on the involvement of all stakeholders concerned.

This is new for local authorities to develop and implement a municipal development plan (CDP) is a planning document that defines simplifies according to priorities and resources available locally, the principles of stock, planning, economic and social development of the town over a period of time (3,4,5 years) and who should be the sole reference framework for all development in the town while not forgetting enrol in the logic, the spirit and letter of the Rural Development Strategy (RDS) in Niger, in which its axis n4 reflects good governance, strengthening of capacity and decentralization. But the development thereof as noted Mahaman ABBA, is accompanied by partners than the municipalities themselves, since the manufacturing cost is high. In our case, the municipality of Kalfou (one of the townships of the urban community of Tahoua) was able to achieve in 2005 for a total of15 blow, 8 million CFA francs ($ 31,600) with the support of a project called fight against poverty (LUCOP), cons by the two municipalities of Tahoua (within one township) of the said locality could not elaborate because of the partners because it is equivalent to the sum of 11.5 million CFA francs ($ 23,000), while its annual budget barely exceeds the 40 000 000Fcfa ($ 80,000).(ABBA,2009).

This could be a factor in the non-completion of the planned and therefore requires the collaboration of all stakeholders (local elected officials, citizens, authorities customary, state).

About, our aim and objectives, we can note that decentralization in Niger is planning about administrative supervision. The bases of the reform being thrown out with the organization of local elections, which type of reports that municipalities will maintain with the State if indeed that decentralization does not mean privatization or functional delegation? In analyzing the Act No. 2002-012 of 11 June 2002 establishing the fundamental principles of the free administration of regions, departments and municipalities as well as their skills and resources, we realize that the pattern of future relationships between the State Public appears as a double dynamic of support: mentoring and advisory support. Guardianship is a key element of decentralization. It is not presumed. In other words, there is no guardianship without texts. In the current context of Niger, one of the decentralization reform, the law No. 2002-012 states that the aforesaid events through judicial review and inspection. As traditional leaders, they are part of the law of the right member of council of the spring commune. Their voices are not deliberative, which is not without playing on their symbolic.

But, we should remember that, the decentralization process is a reality in the country. The commune functioned according to administrative supervision. The ministry on charge elabore a code of working for all actors involved. Since then, in the urban communes of Tahoua, there is no conflict between traditional chiefs and mayors but only the change of role. The new mayor control administration as Webber define his ideal bureaucracy even there are different and the role of traditional chief is respected because there are members of municipal council

10   CONCLUSION

The desire to involve people in their own development through decentralization could be achieved according to the administrative supervision but also from the dynamism of the different actors. Indeed, despite plans micro-and macro-economic and institutional designs associated with logic of territorial development of opinions and reactions were observed in the population to which the action is intended. This situation stems from the fact that there are societal logic that development must consider in their action. These reactions show that this is not so much the desire that drives people to join but rather taking into account their realities in the implementation of various development projects.

The process of decentralization should be a synthesis of different approaches mentioned above and not as an opposition to the defense of strategic interests for the full measure of its content and the achievement of its objectives. It is possible that having the good method to educate the public. Now, the foundations for reform are implemented, what are the issues and challenges as well as the structuring of the socio-political mandate after a new joint exercise? What interests for these towns in a decentralized cooperation through the Partnership Agreement ACP-EC?

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LA GESTION DES DECHETS ET SON IMPACT SOCIO-SANITAIRE DANS LE CENTRE RURAL DE WALUNGU

John Kashinzwe Kibekenge

Institut Supérieur Pédagogique de Walungu, I.S.P/Walungu, RD Congo

ABSTRACT: The production of waste throughout the world is often related to the importance of the human populations in the areas, their concentrations or dispersions like their activities. However their management is dependent on the degree of civilisation and instruction of the people. The rural center of Walungu has said "Walungu Center" knows a demographic explosion without preceding for one decade busy by 1064habitants in 2006 to 2000 individuals in 2014 on only 4Km2. This demographic boom which attracts the curiosity of more than one person is particularly related to a positive migratory balance (40.6% emigration and 59.4% immigration), consequence of the massive escapes of the populations in prey of insecurity in the peripheral villages (bands armed), a high birth rate (55%0: Third world) but also attracted by the medical infrastructures (General hospital of Walungu, EFSKI), school (five secondary schools of reputation and the Teaching Institute of higher learning of Walungu, ISP/Walungu), administrative (chief town of the territory), usual E, sedentary (camps of the Mission of the Organization of the United Nations for Maintains Security in Congo, MONUSCO as well as the presence of the Armed forces of the Democratic republic of Congo, FARDC) and commercial (market power station of Mudwanga). This center which, today appears like a city, knows inter alia problems waste and their management. Indeed, it is observed in this center of waste of various origins (domestic: 85%, schools, market, church, hospital: 12% and of the camp of the MONUSCO: 3%) and of various nature (organic: 75% and inorganic: 25%) The latter are badly managed however their good management would constitute more advantages than of disadvantages being given their natures: 75% organics and of domestic origin, not of industries which would produce toxic wastes except the MONUSCO.

Although the near total of this waste is used as fertilizers (58%), the latter involve not bad environmental and consequently socio-medical problems: air pollution (breathing), of water and the tablecloths (hydrous diseases), of the ground (cultures)… to which the local populations assist powerlessly.

KEYWORDS: Waste, management, impact, environment, health.

RESUME: La production des déchets à travers le monde est souvent liée à l'importance des populations humaines dans les régions, leurs concentrations ou dispersions ainsi que leurs activités. Cependant leur gestion est tributaire du degré de civilisation et d'instruction des peuples. Le centre rural de Walungu dit « Walungu Centre » connait une explosion démographique sans précédent depuis une décennie passant de 1064habitants en 2006 à 2000 individus en 2014 sur seulement 4Km^2. Ce boom démographique qui attire la curiosité de plus d'une personne est particulièrement lié à un solde migratoire positif(40,6% émigration et 59,4% immigration), conséquence des fuites massives des populations en proie d'insécurité dans les villages périphériques(bandes armés), un taux de natalité elevé(55%0 : Tiers monde) mais aussi attirées par les infrastructures sanitaires(Hôpital General de Walungu, EFSKI), scolaires(cinq écoles secondaires de renom et l'Institut Supérieur Pédagogique de Walungu, ISP/Walungu), administratives(chef-lieu du territoire), coutumier e, sécuritaire(camps de la Mission de l'Organisation de Nations-Unies pour le Maintien de la Sécurité au Congo, MONUSCO ainsi que la présence des Forces Armées de la République Démocratique du Congo, FARDC) et commerciales(marché centrale de Mudwanga). Ce centre qui, aujourd'hui parait comme une cité, connait entre autres problèmes les déchets et leur gestion. En effet, il s'observe dans ce centre des déchets d'origines diverses (ménagers : 85%, écoles, marché, église, hôpital : 12% et du camp de la MONUSCO : 3%) et de différentes natures (organiques : 75% et inorganiques : 25%) Ces derniers sont mal gérés

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Corresponding Author: John Kashinzwe Kibekenge

pourtant leur bonne gestion constituerait plus d'avantages que d'inconvénients étant donné leur natures : 75% organiques et d'origine ménagère, pas d'industries qui produiraient des déchets toxiques sauf la MONUSCO.
Bien que la quasi-totalité de ces déchets soit utilisés comme fertilisants (58%), ces derniers entrainent pas mal des problèmes environnementaux et par conséquent socio-sanitaires : pollution de l'air (respiration), des eaux et des nappes (maladies hydriques), du sol (cultures)… auxquels les populations locales assistent impuissamment.

MOTS-CLEFS: Déchets, gestion, impact, environnement, santé.

1 INTRODUCTION

La gestion des déchets, une des branches de la rudologie appliquée, est la collecte, le transport, le traitement (le traitement de rebut), la réutilisation ou l'élimination des déchets, habituellement ceux produits par l'activité humaine, afin de réduire leurs effets sur la santé humaine, l'environnement, l'esthétique ou l'agrément local. L'accent a été mis, ces dernières décennies, sur la réduction de l'effet des déchets sur la nature et l'environnement et sur leur valorisation[1]. Cette gestion est, depuis un temps, au cœur des préoccupations de toutes les couches et tendances humaines aussi bien au niveau planétaire, régional, national, territorial que local. Hélas, la quasi-totalité des recherches entreprises et menées dans ce domaine sont orientées vers les milieux urbains, des régions industrielles, des milieux maritimes et encore(…) oubliant que les milieux ruraux connaissent également des problèmes de gestion des déchets auxquels ils font face en dépit des espaces disponibles pour leur évacuation et qui, progressivement, entrainent des problèmes environnementaux et par ricochet, socio-sanitaires pour les populations locales.

En effet le centre rural de Walungu a, à travers le temps, connu bien des mutations d'ordre démographique, infrastructurel et environnemental jusqu'à avoir aujourd'hui l'image d'une cité avec, sans nul doute, des problèmes de gestion des déchets d'origines différentes et des diverses natures. Ils n'ont pas que d'impacts négatifs (pollution et dégradation du milieu) mais aussi positif (fertilisants et fourrage).

Nous voulons, ainsi dans cette étude, mettre en relief la situation et la gestion des déchets à Walungu centre et leur incidence positif ou négatif sur son environnement et sa population mais également proposer un mode de gestion spécifique ou adapté à ce milieu rural, les réalités de ses déchets étant differentes de celles d'ailleurs (villes, industries, marins…).

2 APPROCHE METHODOLOGIQUE ET TECHNIQUES

Pour avoir des données fiables et complètes ainsi que leur traitement scientifique objectif pour des bons résultats de cette étude, nous avons, particulièrement, emprunté les méthodes et techniques suivantes :

L'enquête : toute étude orientée vers la population, ses mœurs, ses activités et son environnement nécessite absolument des enquêtes sur terrain[2]. Ainsi nous avons élaboré un questionnaire d'enquête de 20 questions portant sur les déchets, leur gestion ainsi que leurs conséquences sur le milieu et la population. Un échantillon de 250 ménages et sociétés ou encore établissements a été choisi dans un univers de 462 ménages dénombrés à Walungu centre soit 54,1%. Il s'en est suivi un dépouillement par la méthode classique simple. Voici notre questionnaire :

République Démocratique du Congo

Enseignement supérieur et universitaire

Institut Supérieur Pédagogique de Walungu, ISP/Walungu

Questionnaire d'enquête

Sujet : **LA GESTION DES DECHETS ET SON IMPACT SOCIO-SANITAIRE DANS LE CENTRE RURAL DE WALUNGU »**

1. Existe-il des déchets dans votre parcelle ? Oui ☐ Non ☐

2. Quelles sortes des déchets que vous produisez ?

- Déchets liquides ☐ Déchets tranchants ☐ Déchets solides ☐

- Déchets biologiques ☐ Déchets gazeux ☐ Déchets industriels

3. Quelle quantité des déchets produisez-vous-vous par jour ?

1Kg ☐ 5Kg ☐ 10Kg ☐ plus de 10Kg ☐

4. Existe-il des déchets produits localement identifiables dans votre entreprise comme :

Ecole ☐ Marché ☐ Eglise ☐ Centre de santé ☐ Hôpital ☐

5. Quel outil utilisez-vous pour collecter les déchets dans votre environnement ?

Sachet ☐ ac ☐ au métallique S☐ plastique Bassin ☐

6. Avez- vous un partenaire chargé de la collecte des déchets ?

Oui ☐ on ☐ stinence ☐

7. Avez-vous le temps de gérer vos déchets ? Oui ☐ Non ☐ Abstinence ☐

8. Quelle est la destination des déchets que vous produisez ?

Dans la forêt ☐ Coins invisibles ☐ Dans les de culture ☐

9. Avez-vous des dépotoirs ? Oui ☐ Non ☐ Abstinence ☐

10. Si Oui, Publique ☐ ou privé ☐

11. Que faites-vous de ces déchets ? Fertilisant ☐ Vendre ☐ Sans valeur ☐

12. Savez-vous les conséquences de ces déchets ? Oui ☐ Non ☐ Abstinence ☐

13. Si Oui, lesquelles ? la mort ☐ maladies ☐ pauvreté ☐ pollution de la nature ☐

14. Qu'est ce qui est à la base de ces maladies ? Insalubrité ☐ eau usée ☐ herbage ☐

15. Quelle stratégie visible et immédiate pour prévenir les maladies ?

Moustiquaire ☐ hygiène du milieu ☐ vaccination ☐ soins médicaux ☐ contacter les magiciens ☐

16. Quels sont les services chargés de la gestion des déchets dans ce centre de Walungu ?

L'Etat ☐ Infirmier ☐ volontaire ☐ cultivateur ☐ ONG ☐ tout le monde ☐ personne ☐

17. Dans quelle saison les déchets sont-Ils abondants ? des pluies ☐ sèche ☐

18. La saison sèche est-elle égale à la saison des pluies ? Oui ☐ Non ☐ Abstinence ☐

19. Si Oui, quelles peuvent en être les causes ? Destruction de l'environnement ☐ Phénomène naturel ☐

Autres raisons ☐

20. Etes-vous membre d'une association d'hygiène et assainissement ou autres associations de protection de l'environnement ? Oui ☐ Non ☐ Abstinence ☐

   a. La méthode quantitative : Par celle-ci nous avons eu des données quantitatives sur les déchets et selon différents aspects considérés lesquelles ont été traité statiquement sous forme des tableaux.

   b. L'analyse : après analyse des données recueillies par nos enquêtes, nous sommes arrivé à des résultats et proposer d'éventuelles pistes de solution ou orientations.

   c. Documentation : en fin certains ouvrages et sites internet traitant des questions environnementales et des déchets, en particulier, ont été consultés pour une bonne compréhension de cette recherche et une éventuelle comparaison.

3   RÉSULTATS ET DISCUSSION

Les résultats de notre recherche sur les déchets à Walungu Centre sont repris dans les tableaux ci-après et leurs graphiques au regard de leurs titres ou dénominations spécifiques selon les différents aspects de cette recherche.

*Tableau 1 et figure 1. Les sites de production des déchets à Walungu Centre*

LIEUX	%
Ménages	69
Marché	12
Ecoles	8
Hôpital	7
MONUSCO	3
Autres	1
TOTAL	**100**
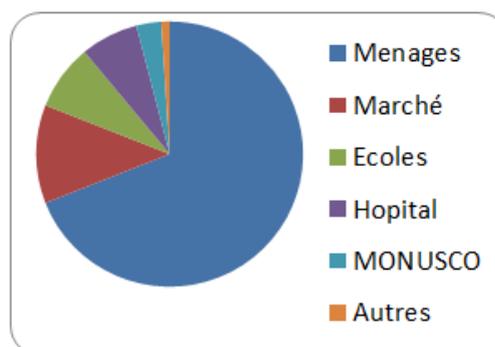
Il ressort de ce tableau et son graphique que la quasi-totalité des déchets produits à Walungu Centre sont d'origine ménagère, le marché de Mudwanga occupant la deuxième position. A noter que ce marché produirait même plus que les ménages s'il était ouvrable tous les jours de la semaine(le Dimanche seulement).

Tableau2 et Figure2. Types des déchets produits

| NATURE	%
Biologiques	74
Solides	19
Liquides	4
Tranchants	2
Gazeux	0
Industriels	0
TOTAL	**100**
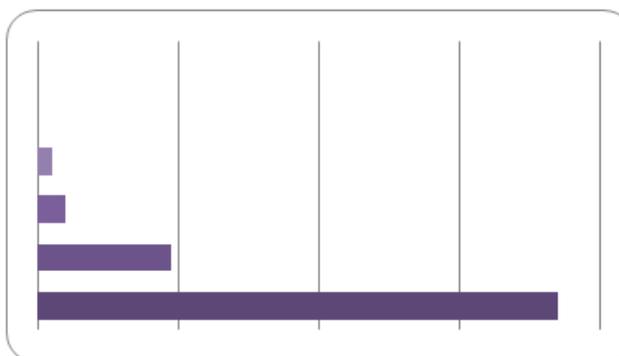
Il existe dans le monde plusieurs types de déchets à l'occurrence les déchets organiques , minéraux(industriels), gazeux, liquides solides, biodégradables et non biodégradables …[3].

L'inexistence des industries ou usine dans la cité de Walungu Centre justifie, au regard du précédent tableau, la prédominance des déchets organiques dans ce milieu (75% des déchets produits). Ces déchets sont plus solides que liquides.

*Tableau 3 et Figure 3. Moyenne des déchets produits par jour et par service*

SERVICE	QUANTITE Kg/Jour	%
Ménages	416	50
Marché	150	18
Ecoles	116	13,9
Hôpital	42	5
MONUSCO	83	9,9
Autres	25	3
TOTAL	832	100
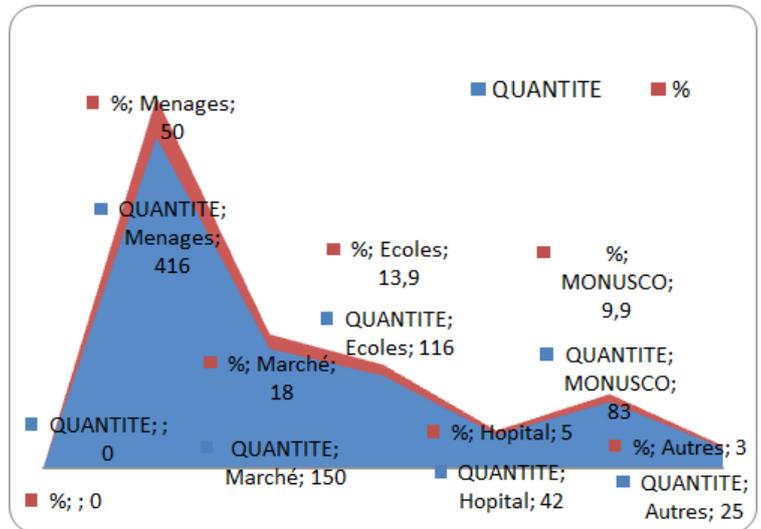
Une moyenne de 832 Kilogrammes des déchets sont produit à Walungu Centre soit 23296 par mois (23 tonnes), les ménages, le marché et les écoles l'emportant sur les autres étant donné leurs activités.

*Tableau 4 et Figure 4. Fréquence de production des déchets selon les saisons*

SAISONS	FREQUENCE (%)
Sèche	7
Pluies	93
TOTAL	**100**
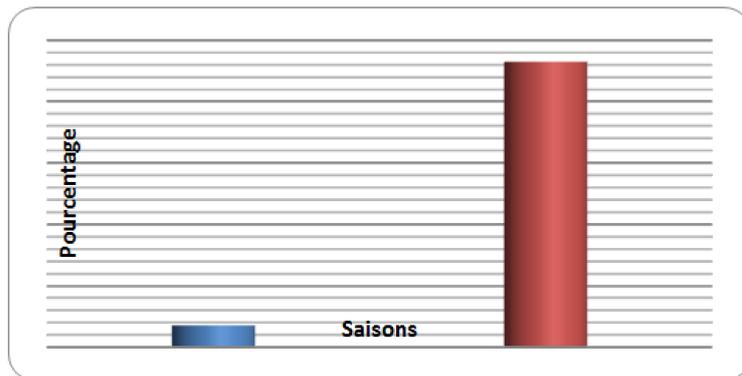
Ceci montre clairement que plus des déchets sont produit en saison sèche qu'en saison des pluies. En effet, les activités de la population en saison sèche sont plus favorables à la production et stockage des déchets mais aussi et surtout ces derniers sont moins décomposés ou encore évacués pendant cette saison qu'en saison des pluies où l'eau joue un rôle prépondérant dans la gestion des déchets.

Tableau 5 et Figure 5. Outils de collecte des déchets

OUTILS	FREQUENCE (%)
Sac	70
Sceau plastique	15
Sceau métallique	4
Bassin	10
Sachet	1
TOTAL	100
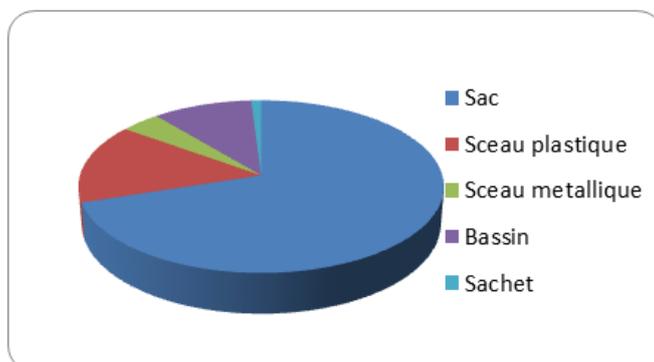
L'inexistence d'un service d'évacuation des déchets à Walungu Centres oblige la population d'utiliser ses moyens de bord pour cette fin : sac, sceau, bassin…

Tableau 6 et Figure 6. Destination des déchets

DESTINATION	%
Champs de culture	40
Coins invisibles	30
Composte	18
Parcelles	9
Autres	3
TOTAL	100
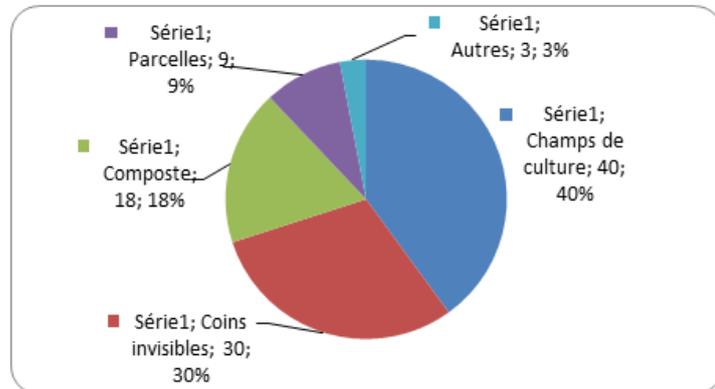
L'évacuation des déchets dans des décharges est de loin la méthode la plus courante. La majeure partie de ce qui n'est pas déposé dans les décharges est incinéré et très peu de déchets solides se trouvent dans des installations de compostage[4]. Le choix d'une méthode d'évacuation dépend presque entièrement des coûts, qui dépendent à leur tour de la situation financière de la région mais aussi de la nature des déchets [5].

L'analyse du précédant tableau et de son graphique montre qu'il n'en est rien de tout ça à Walungu Centre, la notion des déchets et de leur gestion étant mal connue dans ce milieu rural pauvre. C'est ainsi que chaque ménage ou entreprise gère ses déchets dans son enceinte en faisant, pour la plupart des cas, des fertilisants par des compostages (Figure 7). Les détritus combustibles sont incinérés, les non combustibles étant abandonnés dans la nature qu'ils dégradent malheureusement.
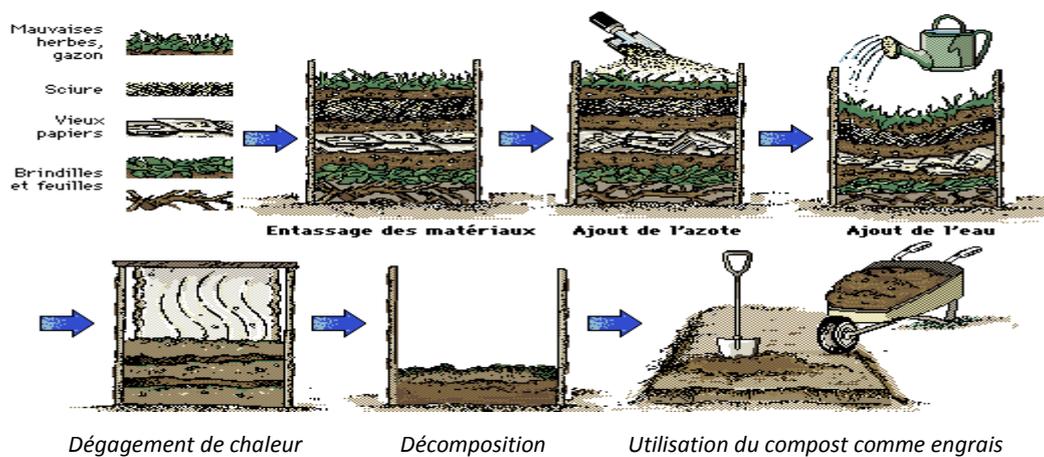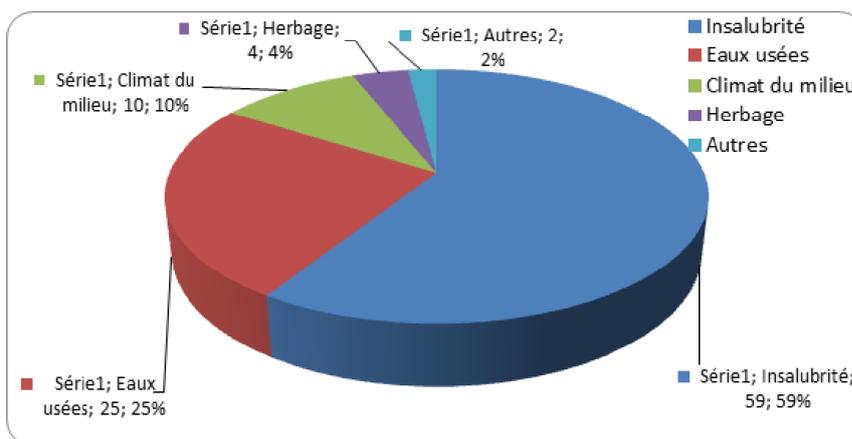

Figure7. Processus de compostage

*Tableau 7 et figure 8. Origines des maladies à Walungu Centre*

CAUSES	FREQUENCES (%)
Insalubrité	59
Eaux usées	25
Climat du milieu	10
Herbage	4
Autres	2
TOTAL	100

L'incidence de la gestion des déchets dans les monde se répercute sur la santé humaine avec des conséquences néfastes qu'ils entrainent par prolifération ou diversification des insectes, mouches, poux, moustiques qui sont des agents pathologiques et véhiculaires des certaines maladies aussi bien endémiques qu'épidémiques. La mauvaise gestion des déchets dans la cité de Walungu Centre entraine, en effet, des maladies d'origine hydrique, des mains sales, des infections pulmonaires et autres. L'hôpital General de Référence de Walungu enregistre une moyenne de 170 cas des malades victimes de cette situation en saison des pluies et 110 cas en saison sèche. En effet, les corps gazeux qui contaminent l'air ne laissent pas intact les nappes d'eau souterraines. Le sol et les végétaux n'échappent pas à cette situation et partant l'homme de Walungu qui y vit et en vit. La MONUSCO accentue la situation par ses déjections liquides sans control. En fin, il n'est point besoin de dire encore que l'environnement de Walungu Centre est aussi victime de cette situation.

Tableau 8 et Figure 9. Mode de prévention contre les maladies dans le milieu

MODE DE PREVENTION	%
Hygiène du milieu	59
Soins médicaux	30
Moustiquaires	8
Vaccination	2
Contacter le magicien	1
TOTAL	100
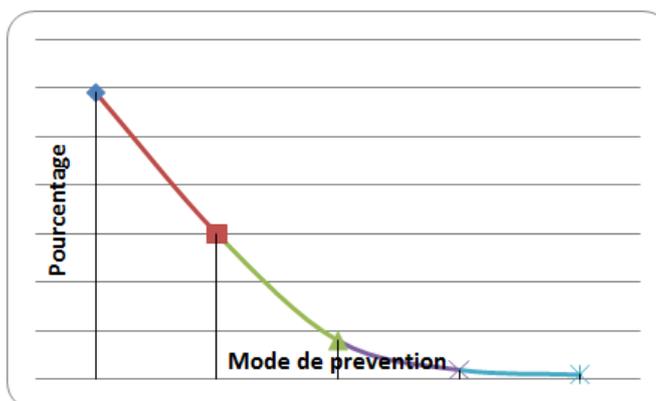
Au vue de ce tableau, nous pensons que l'assainissement de ce milieu préserverait la population des maladies liées l'insalubrité.

Eu égard à ces résultats et les discussions faites sur les déchets à Walungu Centre et leur gestion, certes ce milieu, avec une explosion démographique exponentielle, connait un problème de gestion de ses déchets lié à une sous information et/ou mal information de la population car ces déchets, loin de porter atteinte à l'environnement et à la santé humaine, seraient un atout majeure au développement agraire de la périphérie de ce centre rural(engrais organiques) avec une dégradation édaphique manifeste.

Ainsi, une bonne politique de gestion des déchets s'impose dans ce milieu avec, d'abord, la prise de conscience des autorités locales des responsabilités qui les incombent dans la dégradation de cet environnement et les risques socio-sanitaires qui en résultent ; ensuite, l'implication manifeste de l'élite intellectuelle dans la vulgarisation des méthodes de gestion des déchets au cours des audiences scientifiques(conférences, animations…) en insistant par exemple sur la méthode de la hiérarchie de stratégie par la Règle de Trois R à laquelle s'ajoute le quatrième R [6] pour donner le carré de gestion suivant.
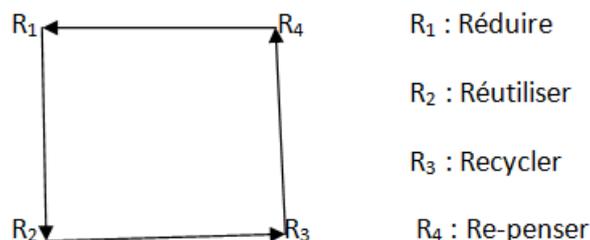
Figure 10. Le carré de gestion des déchets

En fin la population qui a aussi un grand Rolle à jouer comme nous pouvons bien le spécifier à travers le tableau ci-après.

Tableau 9. Action à mener par la population

N⁰	ACTION A MENER	LIEU D'ACTION	RSPONSABLES
01	Conserver les déchets dans des récipients	Maison	Individu Famille
02	Eliminer les débris végétaux et les objets des débris qui jonchent les cours, les entreprises avec les déchets domestiques	Les alentours	Individu Famille
03	S'abstenir de réserver ça et là les déchets dans les rigoles ou caniveaux et n'est pas s'en servir comme lieu de stockage collectif, placer les déchets dans des endroits appropriés	La communauté	Communauté Autorité locale
04	Organiser régulièrement le nettoyage des rues et prélèvement des emballages, boites de conserve et rebut…	La communauté	Communauté Autorité locale
05	Organiser l'élimination des déchets par les méthodes hygiéniques loin des zones d'habitation, interdire les stockages des déchets sans production	La communauté	Communauté Autorité locale

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Application de la performance globale au niveau de l'industrie du textile et de l'habillement au Maroc: Etude empirique basée sur le Balanced Scorecard

[Application of the overall performance in Moroccan textile and clothing industry: Empirical study based on the Balanced Scorecard]

Adil Chriyha[1], Zitouni Beidouri[2], and Otmane Bouksour[2]

[1]Ingénieur d'état en textile et habillement de l'ESITH, Doctorant au Laboratoire de Mécanique Productique & Génie Industriel (LMPGI) ; Université Hassan II Ain Chock, Ecole Supérieure de Technologie, Km 7 Route El Jadida, Casablanca, Maroc

[2]Laboratoire de Mécanique Productique & Génie Industriel (LMPGI), Université Hassan II Ain Chock, Ecole Supérieure de Technologie, Km 7 Route El Jadida, Casablanca, Maroc

ABSTRACT: Textile industry represents a significant share of total Moroccan industrial production; it is one of the first industries purveyors of employment in Morocco, which shows the importance of studying performance aspects of this industry. Indeed, among a multitude existing performance models, the BSC (Balanced scorecard) is chosen because it is considered simple, comprehensive and the most used in the world. We specify that axes related to the performance of the textile industry in Morocco, require a study that takes into account the realities and constraints in the sector. In this paper, we studied the importance given to the different axes of the BSC related to the textile and clothing industry in Morocco and we classify them in order of importance following the results of a survey we launched with industry professionals. Finally, the results of this work have as perspective the development of an overall performance model for this industry.

KEYWORDS: overall performance, balanced scordcard, Moroccan textile industry, performance axis, performance management.

RESUME: L'industrie textile représente une part importante de la production industrielle totale au Maroc, elle est l'une des premières industries pourvoyeuses d'emploi au Maroc, ce qui montre l'intérêt de l'étude des aspects de performance de cette industrie. En effet, parmi une multitude de modèles de performance existants, nous avons choisi le BSC (Balanced scorecard) qui est considéré comme simple, global et le plus utilisé mondialement. Nous précisions que les axes liés à la performance de l'industrie du textile au Maroc, nécessitent une étude qui tient en compte des réalités et des contraintes liées à ce secteur. Dans cet article, nous avons étudié l'importance donnée aux différents axes du BSC liés à l'industrie du textile et habillement au Maroc, et nous les avons classés par ordre d'importance suite au résultat d'une enquête qu'on a lancée auprès des professionnels du secteur. Finalement, les résultats de ce travail ont eu comme perspective la mise en place d'un modèle de performance globale pour cette industrie.

MOTS-CLEFS: la performance globale, le balanced scordcard, l'industrie textile au Maroc, les axes de la performance, management de la performance.

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1   INTRODUCTION

Concevoir, gérer et exploiter les outils industriels afin de garantir productivité, flexibilité, pérennité et sécurité, telle est l'ambition de la performance industrielle dans l'industrie du textile et de l'habillement marocaine dans un contexte difficile que connaît le secteur pendant les dix dernières années[1].

L'action conduite par cette article a pour objectif de proposer aux entreprises du secteur textile et habillement des solutions qui leurs permettent de tirer parti de leur organisation industrielle [2]: accroître la qualité de la production, optimiser le patrimoine industriel, capitaliser les compétences présentes au sein des entreprises, satisfaire les contraintes réglementaires en matière de sûreté, d'environnement et de sécurité. [3]

La performance industrielle est aujourd'hui basée sur le quadriptyque qualité - coûts – délais et flexibilité. [4] C'est en réalisant la meilleure synthèse possible entre les objectifs de ses différents projets que l'entreprise progresse en terme de qualité de coûts et de délais, restant ainsi concurrentielle et satisfaisant aux exigences des marchés. Les études théoriques montrent que le progrès dans ces quatre domaines est principalement issu d'une organisation du travail basée sur la notion de projet. C'est cette transversalité qui assure à l'entreprise une source d'idées nouvelles à même d'améliorer en continu les performances. [5] Cette stratégie de découpage des tâches permet également une plus grande réactivité. [6]

2   LA PERFORMANCE GLOBALE ET SES MODÈLES

2.1   DÉFINITION DE LA PERFORMANCE GLOBALE

L'environnement, les méthodes de travail, les matériels, l'organisation, les contraintes, la culture d'une entreprise semblent avoir atteint un fort niveau de complexité. [7] Cependant, il ne faut pas, pour autant, perdre de vue l'objectif d'une entreprise industrielle : vivre et prospérer. L'entreprise doit pour cela savoir répondre aux attentes du marché. Elle doit réaliser les produits que veulent les clients, dans les délais et avec le niveau de qualité qu'ils souhaitent, au plus bas prix. Parallèlement à la satisfaction de ces attentes qui conditionne ses résultats immédiats, elle doit satisfaire une exigence de création de potentiel dont dépend sa compétitivité à long terme (produits nouveaux, technologies nouvelles, compétences des collaborateurs, amélioration des processus, respect de l'environnement). [8] L'expérience montre que, sur ces différents domaines, les entreprises ont souvent des progrès à faire. Pour améliorer leur compétitivité dans un univers industriel de plus en plus agressif, les entreprises doivent lutter contre une série de handicaps à savoir : le manque de souplesse et de réactivité; le gaspillage de main d'oeuvre, de temps, de matière; l'inefficacité des équipements productifs et des locaux; la non maîtrise de la qualité; une innovation déficiente. [9] Prendre le contre-pied de ces handicaps, c'est justement améliorer la performance industrielle. Promouvoir la performance industrielle, c'est avoir comme principale cible le recensement des non qualités et de l'élimination de leurs causes. [10]

2.2   LES ENJEUX DE LA PERFORMANCE INDUSTRIELLE

Le coût et la qualité restent toujours des atouts importants, mais il apparaît que ce type d'avantage concurrentiel est difficile à défendre sur le long terme. [11] Les produits peuvent être dupliqués et les délais de réaction deviennent de plus en plus courts. Devant cet état de fait, les entreprises les plus performantes changent d'approche. Au lieu de rechercher une différenciation tangible sur les caractéristiques des produits, elles mettent en avant la notion de service. Dans ce contexte, ce n'est plus l'évolution des produits qui donne son fondement à la création de valeur, mais la maîtrise des activités accompagnant la production (recherche, marketing, logistique). [12] La politique industrielle ne peut plus se focaliser seulement sur la baisse des coûts. Elle doit traiter de façon concomitante un ensemble d'objectifs, auparavant considérés comme contradictoires : les coûts, les délais, l'innovation, la qualité et trouver le meilleur compromis par rapport à l'attente des clients. Toute entreprise cherche à répondre à trois problématiques en s'inscrivant dans une démarche de performance industrielle, la première est de chercher un positionnement compétitif, [13] la deuxième, est d'avoir une description instantanée des états des lieux qui permet d'entreprendre des actions pertinentes, [14] et la troisième, est comment mettre l'Homme au cœur de l'action.[15] Ces problématiques devraient amener beaucoup de chefs d'entreprise à s'intéresser au sujet. Globalement les enjeux de la performance globale peuvent être résumés sur trois volets : Le premier est l'évolution vers plus de mécanisation et d'automatisation confère à la fiabilité des équipements une portée déterminante (aspect cumulatif des pannes, importance liée aux cadences…), plus l'entreprise mécanise et automatise, plus le risque de panne augmente et plus leur impact est grand. Le deuxième est l'élévation de la qualité, notamment la pression des enseignes de distribution, met l'entreprise en demeure de satisfaire des niveaux d'exigence croissants, ainsi que la non maîtrise de la

qualité des produits entraîne une cascade de coûts (contrôles, mises en quarantaine, retours…) difficiles à supporter. La troisième est la recherche des flux tendus tout au long des filières et la volonté des enseignes de distribution de réduire les stocks, aboutit à des lots de plus en plus petits. À cela correspond une diminution du temps utile des lignes en raison des changements de produit ou de format. La multiplication des références commerciales a les mêmes conséquences. Ce challenge conduit à mettre en avant une exigence de transversalité et de solidarité professionnelle. D'une part, il faut inciter les salariés à adopter les objectifs de l'entreprise de manière à ce que les microdécisions qu'ils opèrent soient en cohérence avec ceux-là. D'autre part, il s'agit qu'ils s'impliquent davantage et conçoivent leur rôle comme une « mission » avec tout ce que cela suppose d'engagement, d'esprit d'initiative et de créativité. Cet appel à repenser le rôle des ressources humaines signifie que les changements organisationnels et managériaux sont nécessaires et qu'une modernisation réduite à une évolution des machines n'est pas à la mesure des enjeux d'aujourd'hui. Une nouvelle approche des fondements de la performance industrielle doit prévaloir.

2.3 PERFORMANCE INDUSTRIELLE ET DÉMARCHE « DÉVELOPPEMENT DURABLE »

Appréhendée originellement sur un plan strictement financier, la performance a été progressivement élargie, au cours du vingtième siècle, afin de prendre en considération la «responsabilité sociale» de l'entreprise vis-à-vis de ses différents ayants droit. Zenisek (1979) a ainsi segmenté l'évolution historique des entreprises en quatre phases principales. Alors que la gestion concernait essentiellement les dirigeants et les actionnaires au cours des années 1850-1910, la montée en puissance des syndicats a induit une prise en considération croissante des salariés au cours de la période 1900-1950. En présence d'une offre supérieure à la demande, les techniques de marketing ont dû être développées afin de mieux répondre aux besoins du consommateur tout au long des années 1945-1965. Le jeu des acteurs s'est donc progressivement étendu aux clients, aux fournisseurs et aux distributeurs. Enfin, à partir du milieu des années 1960, le nombre des doléances sociétales à l'encontre des entreprises a fortement progressé. On a progressivement exigé de la part des firmes une internalisation croissante de certains coûts sociaux et environnementaux. Cependant, comme le rappellent Tuzzolino et Armandi (1981), toute entreprise cherchera avant tout à assurer sa rentabilité économique. Une fois celle-ci assurée, elle pourra alors envisager certaines actions philanthropiques, allant au-delà de ses seules obligations légales. Il reste cependant à déterminer dans quelle mesure de telles actions peuvent être justifiées. Il s'agit également de mieux cerner les contours de concepts tels que la responsabilité sociétale ou la performance sociétale. La prise en compte des dimensions sociales et environnementales constitue désormais une préoccupation cruciale au sein des entreprises textile et habillement au Maroc. Rattachées aux champs actuels de la création de valeur partenariale ou de la gestion des relations avec l'ensemble des parties prenantes, elles suscitent nombre de problématiques théoriques et opérationnelles.

3 LE BALANCED SCORECARD : BSC

3.1 QU'EST CE QUE LE BALANCED SCORECARD

Le balanced scorecard (ou tableau de bord prospectif en français) est un outil managérial permettant de mesurer l'activité d'une entreprise. Il a été développé en 1992 par deux économistes américains Robert S. Kaplan et David Norton. Le balanced scorecard est utilisé par les managers afin de s'assurer que l'action de leur entreprise est conforme aux objectifs fixés sur le moyen et long terme. Plutôt que de se focaliser uniquement sur des enjeux financiers, il permet de gérer la performance globale d'une société en s'appuyant sur quatre grandes perspectives : la perspective financière (analyse des bénéfices financiers et des pertes), la perspective client (analyse de l'impact de l'entreprise auprès de la clientèle), la perspective processus interne (analyse de l'efficacité des processus internes à l'entreprise) et la perspective apprentissage et développement (analyse de la politique RH de l'entreprise).[16]

Le pilotage stratégique et le pilotage opérationnel sont imbriqués dans les différents axes, grâce à une imbrication des indicateurs stratégiques et des indicateurs historiques. Ces indicateurs sont choisis selon une vision de l'organisation comme un processus, et sont liés de ce fait, par une chaîne de causalité. En effet d'après Kaplan et Norton, il existerait un lien de causalité entre les différents axes du balanced scorecard : une bonne maîtrise du processus interne associé à un réel investissement de l'entreprise dans la recherche de l'innovation, et dans la promotion d'une logique d'apprentissage organisationnel, vont améliorer la satisfaction des clients, entraînant l'atteinte des objectifs financiers de l'entreprise. [17]

Plusieurs études indiquent que le BSC est devenu largement utilisé dans les grandes entreprises aux Etats-Unis [18] , en particulier dans 40 % des entreprises du Fortune 500 et 60 % des entreprises du Fortune 1000. Des études ont rapporté qu'une enquête menée en Allemagne, au Royaume-Uni et l'Italie, a montré que 98 %, 83 % et 72 % des entreprises, respectivement, qui ont répondu étaient familiers avec le concept de la BSC [19]. En Hollande, cette approche est très populaire, à la fois parmi les universitaires et entre les professionnels[20], sans toutefois être vu comme un cas de « mode de gestion ». Une étude menée par Speckbacher et al. (2003)[21] dans les pays européens de langue germanique, avec un taux de 87% de réponse, a conclu que 26 % des entreprises ont mis en œuvre le BSC et 13 % étaient à un stade précoce de la mise en œuvre. En Suède, les données sont encore plus impressionnantes étant donné que, en 1999, 28 % des entreprises de fabrication avaient déjà mis en œuvre le BSC ou d'autres approches similaires.[22] Dans tous les pays nordiques, Danemark, Finlande, Norvège et Suède, ont trouvé des valeurs encore plus expressif pour les plus grandes entreprises, pas particulièrement par le nombre d'entreprises qui avaient déjà adopté le BSC (27 %), mais par le fait que dans deux ans, il est prévu que 61 % d'entre eux pourrait utiliser le BSC[23]. Comme ces auteurs mentionnent, étant donné les quelques années de la méthodologie, représente une diffusion très rapide et efficace. Cette réalité peut être expliquer, au moins en partie, par le fait que les entreprises ont mis en place en Suède une version modifiée du BSC, développé par les managers en fonction du besoin de l'entreprise[24]. Cette approche, qui vise à obtenir un meilleur contrôle de la performance stratégique, résulte de la mise en commun des trois autres composantes (liées au budget, le capital intellectuel et les employés).

3.2 LA STRUCTURE DU BALANCED SCORECARD

Depuis sa création, le Balanced Scorecard semble avoir connu trois stades d'évolution.[25] Dans sa conception originale, premier stade, le Balanced Scorecard se présentait comme un outil de gestion synthétique pour les dirigeants regroupant ces quatre perspectives (finance, marchés, processus, savoirs), censées mesurer au mieux la performance actuelle et prochaine de l'entreprise. Les premiers articles de Kaplan et Norton portaient plus spécifiquement sur le choix d'un nombre limité d'indicateurs dans chacune des quatre perspectives (Kaplan et Norton, 1992).[26] L'évolution qui s'est produite a été caractérisée par Kaplan et Norton en 1996 comme le passage de «an improved measurement system to a core management system» (Kaplan et Norton, 1996)[27], ce qui représente le deuxième stade d'évolution du BSC. Ils plaçaient dorénavant le Balanced Scorecard au coeur d'un «strategic management system», avec une conscience accrue de son rôle crucial dans l'alignement stratégique des comportements des unités de gestion. Les conséquences de ce changement ont été multiples. La pression sur le processus de conception du Balanced Scorecard a augmenté car désormais il faut que les mesures reflètent le plus possible les buts stratégiques de l'organisation. On considère maintenant que la représentation des liens de causalité entre les objectifs stratégiques (connus initialement comme le «Strategic Linkage Model») est un point central dans le mécanisme de conception d'un Balanced Scorecard (Kaplan et Norton, 2001)[28]. Le troisième stade d'évolution historique consiste en un raffinement des caractéristiques de conception du deuxième stade afin de lui donner de meilleures fonctionnalités et d'améliorer la pertinence des liens de causalité. Cela se traduit par une clarification des idées, par une identification plus précise des liens de cause à effet, et par la recherche d'une appropriation par tous les membres de l'organisation des objectifs stratégiques traduits en indicateurs afin de permettre de favoriser les initiatives qui sont, selon Kaplan et Norton (2001), «des projets spéciaux avec des dates de début et de fin, qui visent à donner des indications ou des actions nécessaires pour comprendre les objectifs stratégiques».[29]

Par ailleurs, comment mettre en évidence, dans la structure en quatre parties proposée par Kaplan et Norton, la dimension spécifique des grands projets stratégiques que la direction de l'entreprise doit piloter avec attention, et qui ont souvent les quatre dimensions à la fois (client, processus interne, finance, innovation), par exemple la mise en place d'un service client complètement intégré pour les grands comptes, ou l'investissement dans la vente sur internet? Les deux démarches peuvent constituer un axe stratégique majeur. Les indicateurs correspondants seront-ils considérés comme relatifs à la perspective client, puisqu'il s'agit de reconcevoir la relation avec le client, ou à la perspective financière, puisque les impacts financiers peuvent être rapides et importants, ou à la perspective interne, puisque l'e-business se traduit par le re-engineering complet de processus tels que la logistique, ou à la perspective apprentissage, puisqu'il s'agit à l'évidence de construire de nouvelles compétences? Décidera-t-on de disperser des indicateurs aux quatre coins du tableau de bord ? La part de marché de la vente par internet dans la perspective client, les indicateurs liés au re-engineeering dans la perspective interne, les impacts coûts dans la perspective financière, la formation et la structure de compétences dans la perspective apprentissage, en perdant la vue globale du projet ? En fait, à notre sens, il ne peut y avoir d'autre point de départ à la

réflexion sur le tableau de bord que les axes stratégiques, autour desquels le tableau de bord pourra se structurer, sans chercher à séparer les points de vue internes, externes et financiers. On pourrait résumer les étapes essentielles de la démarche de la manière suivante :

- Formuler explicitement les choix stratégiques,
- Identifier les processus critiques par rapport aux objectifs stratégiques,
- Analyser l'impact de chacun de ces processus sur les objectifs stratégiques,
- En déduire les leviers d'action essentiels,
- Récapituler pour chacun des processus-clés les performances qu'on attend de lui et l'impact qui devrait en résulter pour les objectifs stratégiques.[30]

4 LA PERFORMANCE GLOBALE

4.1 LES APPROCHES DE LA PERFORMANCE GLOBALE

L'engagement des entreprises dans le développement durable consiste à conjuguer performance et responsabilité. La performance financière ne suffit plus à apprécier la performance d'une entreprise. Dès lors, les entreprises doivent mesurer leurs progrès à partir d'une performance plus globale incluant, en dehors de la dimension économique, des dimensions sociale et environnementale. La performance de l'entreprise résulte donc de sa capacité à répondre aux attentes non seulement des actionnaires, mais aussi des salariés, des donneurs d'ordre, des clients, des fournisseurs, etc. Dans une conception de type PME, la finalité de l'entreprise ne se limite pas à produire de la richesse sous forme de dividendes ou de plus values boursières. L'entreprise est un système à multi finalités, ces finalités étant partiellement incompatibles entre elles, chacune favorisant ou défavorisant indûment un groupe d'acteurs par rapport aux autres. L'objectif est de pouvoir atteindre le meilleur équilibre possible entre ces forces contraires, seul garant de la pérennité du système économique.[31] Ce modèle valorise la réussite collective, le consensus, le souci du long terme. La performance d'une entreprise ne peut plus se juger selon la seule perspective financière. Une performance plus globale inclut, en dehors de la dimension économique, des dimensions sociale et environnementale.[32]

Dans ce contexte, la performance se définit à travers trois approches[33] :

Fig. 1.   Les approches de la performance globale

4.2 POURQUOI S'ENGAGER DANS UNE DÉMARCHE DE PERFORMANCE GLOBALE

S'engager dans une démarche de développement durable permet de revoir son mode de production et de fonctionnement, afin d'accroître sa performance globale en ayant une meilleure performance économique et une réduction des impacts environnementaux et sociaux, ainsi qu'une amélioration des relations avec l'ensemble des parties prenantes.[34] Cet engagement signifie l'intégration des dimensions sociale, économique et environnementale dans le mode de gestion de l'entreprise, tout en prenant en compte l'avis des parties prenantes. Ceci dit, qu'avant chaque prise de décision stratégique, il faut se poser les questions suivantes : Quels seront les impacts environnementaux et sociaux ? Quels seront les bénéfices financiers ? Les attentes des acteurs internes et externes sont-elles prises en compte ? Pour cela, Il est indispensable d'intégrer l'ensemble des politiques à la démarche de performance globale :

- Politique de gestion des relations clients,
- Politique de gestion des relations fournisseurs,
- Politique de ressources humaines,
- Gouvernement d'entreprise,
- Politique managériale et sociale,
- Politique environnementale.

Dès lors, l'entreprise limite les risques de pollution et de conflit social. Elle est mieux à même de répondre aux pressions des clients et des donneurs d'ordre, toujours plus exigeants. S'engager dans cette démarche permet aussi de valoriser ses actifs immatériels.[35] Aujourd'hui, une entreprise n'est plus évaluée au seul regard de sa valeur comptable, mais également de son capital immatériel, à savoir sa capacité à créer de la valeur future. Cette valeur immatérielle dépend de neuf actifs immatériels :

- son capital humain,
- ses clients,
- ses fournisseurs,
- ses actionnaires,
- son capital organisationnel,
- son capital environnemental,
- son système d'information,
- sa R&D,
- ses marques.

Cette politique de performance globale, qui intègre à la fois la performance économique à la responsabilité sociétale entraîne la création de valeur immatérielle, atout essentiel en termes de compétitivité et de durabilité, l'économie immatérielle étant l'économie de la durabilité. Ceci permet aussi de répondre aux pressions supportées par l'entreprise.

5 PERFORMANCE GLOBALE DANS L'INDUSTRIE DU TEXTILE ET DE L'HABILLEMENT AU MAROC : ETUDE EMPIRIQUE :

5.1 ENQUÊTE SUR LA PERFORMANCE GLOBALE DANS LE SECTEUR

Nous avons jugé nécessaire d'étudier les pratiques d'application de la performance globale des entreprises du secteur du textile et de l'habillement au Maroc, pour juger leurs niveau d'avancement et de connaissances des bonnes pratiques de la performance globale, décrites dans les ouvrages du management et appliquées par les grandes entreprises mondiales dans les différents domaines. L'enquête était menée entre juillet et décembre 2014, par un questionnaire établi sous google form, son lien était communiqué à la population concernée par mail, avec des explications sur les questions posées principalement par téléphone en cas de besoin. Le questionnaire se compose de trente questions divisées sous les axes principaux de la performance globale, axe financier, axe client, axe apprentissage organisationnel, axe processus interne, axe social et axe environnemental. Les réponses étaient un choix dans une échelle de 1 à 5 selon l'ordre d'importance par rapport à chaque question. La première partie du questionnaire s'est focalisée sur les données générales des entreprises, nationales ou multinationales, le secteur d'activité, leurs capacités de production, ainsi que le volume annuel des matières premières consommées. La deuxième partie du questionnaire était centrée sur l'importance donnée par chaque entreprise à chacun des axes de la performance globale, cités ci-dessus. Sur la troisième partie, il était demandé de donner une notation pour les déterminants de chacun des axes de performance globale. Au niveau de l'axe financier, nous avons demandé de noter l'importance donnée par les entreprises aux déterminants suivants : accroissement du chiffre d'affaire, réduction des coûts, amélioration de la productivité, utilisation de l'actif de l'entreprise et la réduction des risques financiers. Au niveau de l'axe client, les déterminants notés sont la part du marché, l'acquisition de nouveaux clients, la conservation des clients actuels, la satisfaction des clients de l'entreprise et la rentabilité par segment. Les déterminants notés au niveau de l'axe processus interne sont l'innovation technologique, l'innovation au niveau du processus de flux, l'innovation en marketing, la production et le service après vente. Le potentiel des salariés, la réorientation des compétences, la capacité du système d'information, et l'alignement des objectifs individuels avec celles de l'entreprise sont les déterminants notés au niveau de l'axe apprentissage organisationnel. Pour l'axe social, nous avons demandé de noter le cadre de vie dans l'entreprise, le management des

ressources humaines, la sécurité corporelle des collaborateurs, le management des risques et le management des produits chimiques. Et finalement pour l'axe environnemental, nous avons demandé la notation de l'importance donnée au management des matières premières, management de l'énergie, management de l'eau, management des déchets et managements des émissions dans l'air et d'autres émissions. Sur la quatrième partie du questionnaire, nous nous sommes concentrés sur le management de la performance globale dans ces entreprises, les axes suivis par des indicateurs de performance, qui pilote ces indicateurs au niveau de l'entreprise ? qui les suit ? La fréquence de débriefe des indicateurs, est ce qu'ils sont suivis par des plans d'action correctifs et préventifs ? Est ce qu'ils sont SMART (spécifiques, mesurables, atteignables, réalistes et temporels) ? Et finalement, il était demandé de juger la pérennité dans le temps des différents plans d'action pris dans le cadre de la performance globale par rapport à chacune des entreprises enquêtées. Et sur la dernière question, nous avons demandé de donner une estimation du temps nécessaire pour chaque entreprise pour devenir performante sur les différents axes de la performance globale.

5.2 POPULATION ENQUÊTÉE

Toutes les personnes qui ont répondu au questionnaire étaient des managers dans le secteur du textile et de l'habillement, qui ont un point de vu pertinent par rapport à l'application de la performance globale dans leurs entreprises. Au total, le questionnaire était adressé à 54 managers d'entreprises dans le secteur du textile et de l'habillement au Maroc, toute tailles confondues, multinationales, grandes et petites entreprises. Au total, le taux de réponse au questionnaire était de 37% par rapport à la population à laquelle le questionnaire était adressé. 30% parmi eux sont des directeurs généraux, directeurs techniques ou directeurs de département, 20% sont des responsables qualité, 15% sont des responsables de production, 5% sont des responsables supply, 5% sont des financiers et 5% sont des commerciaux. 15% des entreprises que ces personnes représentent avaient un chiffre d'affaire annuel inférieur à 10 millions de MAD, 30% entre 10 et 100 millions MAD, 25% entre 100 et 1000 millions de MAD et 20% ont un CA annuel supérieur à 1000 million de MAD. Les personnes représentent tous les types d'entreprise du secteur du textile et de l'habillement, à savoir des usines de confection, de teinture, de tissage, de tricotage, des usines intégrées, ainsi que des donneurs d'ordre.

5.3 LA PERFORMANCE GLOBALE DANS LES ENTREPRISES DU SECTEUR AU MAROC

30% des entreprises représentées dans le résultat du questionnaire sont des multinationales. Parmi les entreprises interrogées, il n'y a que 55% qui ont déjà entamé une démarche de performance globale incluant les différents axes : financier, client, apprentissage organisationnel, processus interne, social et environnemental. 45% des personnes interrogées ont donné une note de 5 (très important) pour l'importance de l'axe financier dans leurs entreprises, 55% ont donné une importance extrême pour l'axe client, que 20% qui jugent très important dans leurs usines l'axe processus interne, 15% jugent très important l'axe de l'apprentissage organisationnel dans leurs entreprises, l'axe social n'a pas lui aussi de grande importance dans les entreprises du secteur du textile et de l'habillement au Maroc, car que 20% le juge très important, quant à l'axe environnemental, que 5% des entreprises du secteur le considère comme très important.

5.4 L'AXE FINANCIER

5.4.1 RÉSULTAT DE L'AXE FINANCIER

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe financier par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 1. Les déterminants de l'axe financier

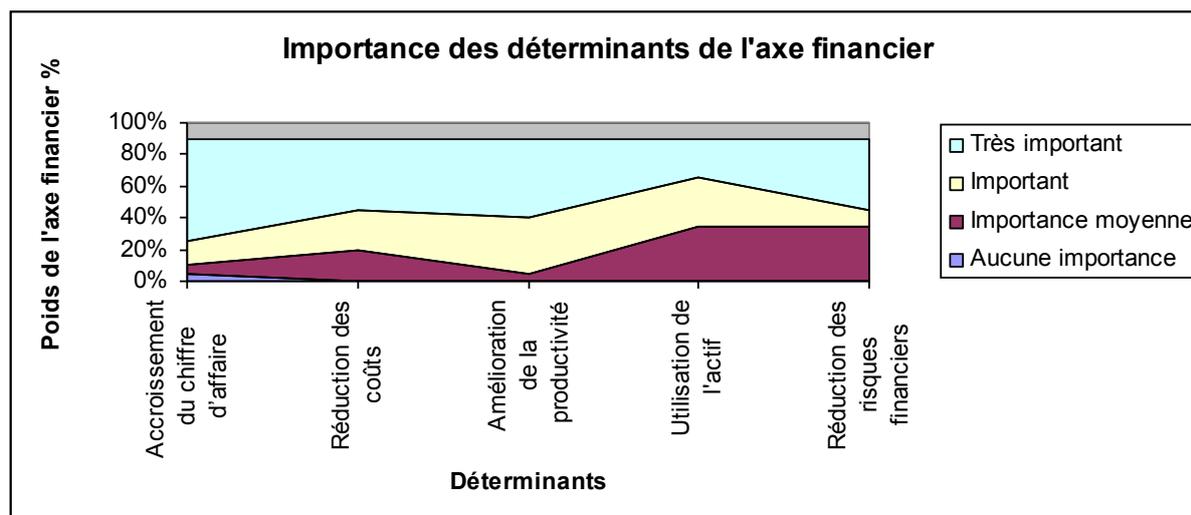| Déterminants de l'axe financier	Aucune importance	Importance moyenne	Important	Très important	Total
Accroissement du chiffre d'affaire	5%	5%	15%	65%	90%
Réduction des coûts	0%	20%	25%	45%	90%
Amélioration de la productivité	0%	5%	35%	50%	90%
Utilisation de l'actif	0%	35%	30%	25%	90%
Réduction des risques financiers	0%	35%	10%	45%	90%
Total Importance par déterminant	5%	100%	115%	230%	450%
Poids de l'axe financier	1%	22%	26%	51%	100%

Fig. 2. Importance des déterminants de l'axe financier

5.4.2 ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE FINANCIER

Il est assez clair que l'axe financier reste un axe central dans la stratégie des entreprises du secteur du textile et de l'habillement au Maroc, les indicateurs des cet axe sont jugés très important avec une moyenne de 51% des managers enquêtés, 26% en moyenne jugent que les indicateurs de l'axe financier sont important, 22% en moyenne jugent qu'ils n'ont qu'une importance moyenne, et 1% en moyenne seulement jugent que l'axe financier n'a aucune importance dans leurs entreprise. Ceci en considérant que les différents indicateurs ont le même coefficient d'importance dans l'axe financier, ce qui sera valable pour les indicateurs de chacun des axes de la performance globale. Finalement, 65% entreprises enquêtées confirment qu'elles ont des indicateurs de suivi de performance pour l'axe financier.

5.5 L'AXE CLIENT

5.5.1 RÉSULTAT DE L'AXE CLIENT

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe client par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 2. Les déterminants de l'axe client

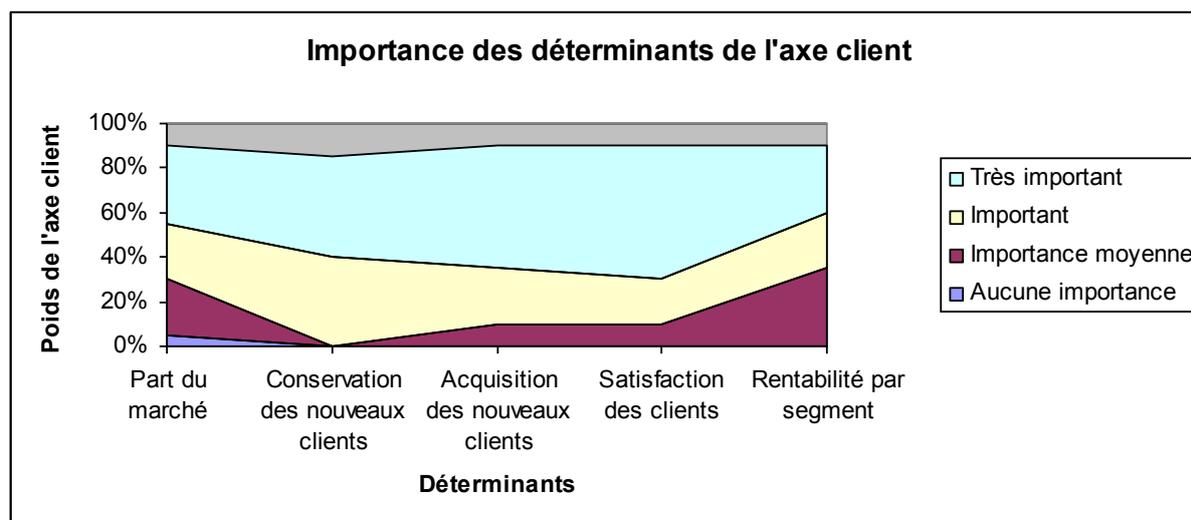| Déterminants de l'axe client	Aucune importance	Importance moyenne	Important	Très important	Total
Part du marché	5%	25%	25%	35%	90%
Conservation des nouveaux clients	0%	0%	40%	45%	85%
Acquisition des nouveaux clients	0%	10%	25%	55%	90%
Satisfaction des clients	0%	10%	20%	60%	90%
Rentabilité par segment	0%	35%	25%	30%	90%
Total Importance par déterminant	5%	80%	135%	225%	445%
Poids de l'axe client	1%	18%	30%	51%	100%

Fig. 3.   Importance des déterminants de l'axe client

5.5.2   ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE CLIENT

Le résultat de notre enquête montre que l'axe client a plus de poids chez les industriels du secteur du textile et de l'habillement que l'axe financier, 51% en moyenne jugent qu'il est très important, tout comme l'axe financier, par contre 30% en moyenne jugent qu'il est important contre 26% pour l'axe financier, 18% en moyenne jugent qu'il a une importance moyenne, et 1% en moyenne jugent qu'il n'a aucune importance. 60% des entreprises confirment qu'elles suivent des indicateurs de la performance au niveau de cet axe.

5.6   L'AXE PROCESSUS INTERNE

5.6.1   RÉSULTAT DE L'ENQUÊTE SUR L'AXE PROCESSUS INTERNE

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe processus interne par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 3. Les déterminants de l'axe processus interne

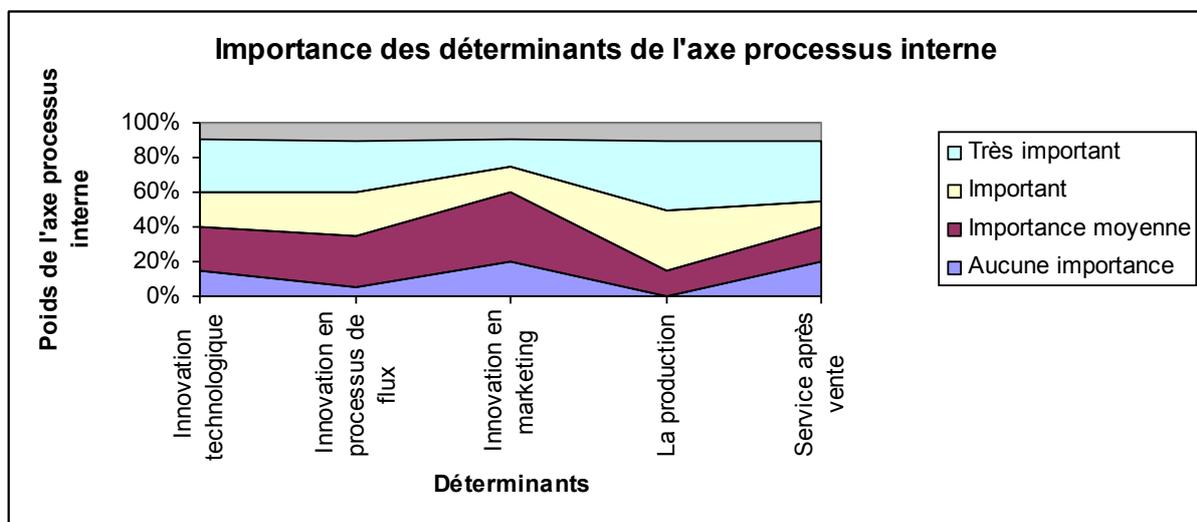| Déterminants de l'axe processus interne	Aucune importance	Importance moyenne	Important	Très important	Total
Innovation technologique	15%	25%	20%	30%	90%
Innovation en processus de flux	5%	30%	25%	30%	90%
Innovation en marketing	20%	40%	15%	15%	90%
La production	0%	15%	35%	40%	90%
Service après vente	20%	20%	15%	35%	90%
Total Importance par déterminant	60%	130%	110%	150%	450%
Poids de l'axe processus interne	13%	29%	24%	33%	100%

Fig. 4.   Importance des déterminants de l'axe processus interne

5.6.2   ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE PROCESSUS INTERNE

A partir de cet axe, on commence à toucher le désintérêt donné par les industriels du secteur aux axes de performance globale. Comme le montre le résultat de l'enquête, que 33% en moyenne jugent très important l'axe de processus interne dans leurs entreprises, 24% en moyenne jugent qu'il est important, 29% jugent qu'il a une importance moyenne, et 13% en moyenne jugent qu'il n'a aucune importance, contre 1% au niveau de l'axe client et financier. Finalement, 70% des entreprises ont des indicateurs de suivi du processus interne, vu que la plupart des entreprises sont animées sur l'efficience en production, le taux de retouche et 2eme choix, ainsi que le taux de livraison à date, et d'autres indicateurs qui permettent d'assurer un suivi minimum de la performance des services de l'entreprises.

5.7   L'AXE APPRENTISSAGE ORGANISATIONNEL

5.7.1   RÉSULTAT DE L'ENQUÊTE SUR L'AXE D'APPRENTISSAGE ORGANISATIONNEL

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe apprentissage organisationnel par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 4. Les déterminants de l'axe apprentissage organisationnel

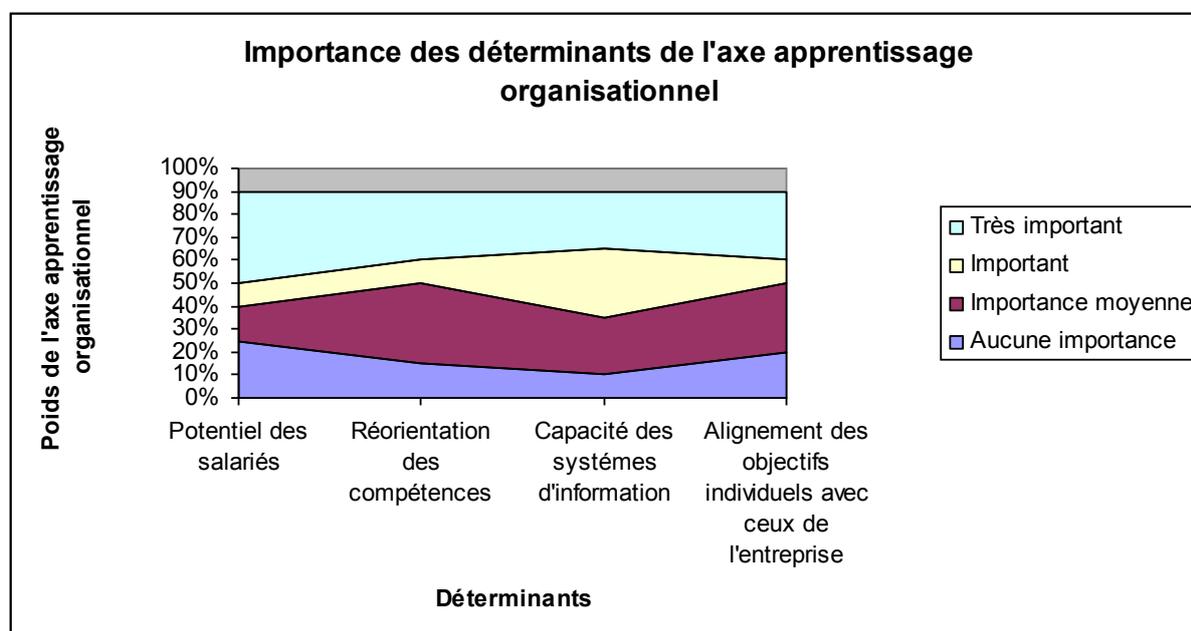| Déterminants de l'axe apprentissage organisationnel	Aucune importance	Importance moyenne	Important	Très important	Total
Potentiel des salariés	25%	15%	10%	40%	90%
Réorientation des compétences	15%	35%	10%	30%	90%
Capacité des systèmes d'information	10%	25%	30%	25%	90%
Alignement des objectifs individuels avec ceux de l'entreprise	20%	30%	10%	30%	90%
Total Importance par déterminant	70%	105%	60%	125%	360%
Poids de l'axe apprentissage organisationnel	19%	29%	17%	35%	100%

Fig. 5.   Importance des déterminants de l'axe apprentissage organisationnel

5.7.2   ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE D'APPRENTISSAGE ORGANISATIONNEL

Au niveau de l'axe de l'apprentissage organisationnel, l'intérêt diverge entre les différentes entreprises en terme d'importance donnée par rapport à chacun des déterminants qui constituent cet axe. 35% en moyenne des personnes enquêtées ont jugé que l'axe apprentissage organisationnel est très important dans la gestion de performance dans leurs entreprises, 17% en moyenne ont jugé qu'il est important, 29% en moyenne jugent qu'il n'a qu'une importance moyenne, et 19% en moyenne disent qu'il n'a aucune importance dans leurs entreprises. Finalement, que 5% des entreprises suivent cet axe avec des indicateurs de performance. Un chiffre alarmant sur le management des ressources humaines dans l'industrie du textile et de l'habillement au Maroc, et l'importance donnée à l'Homme en tant que créateur de richesse.
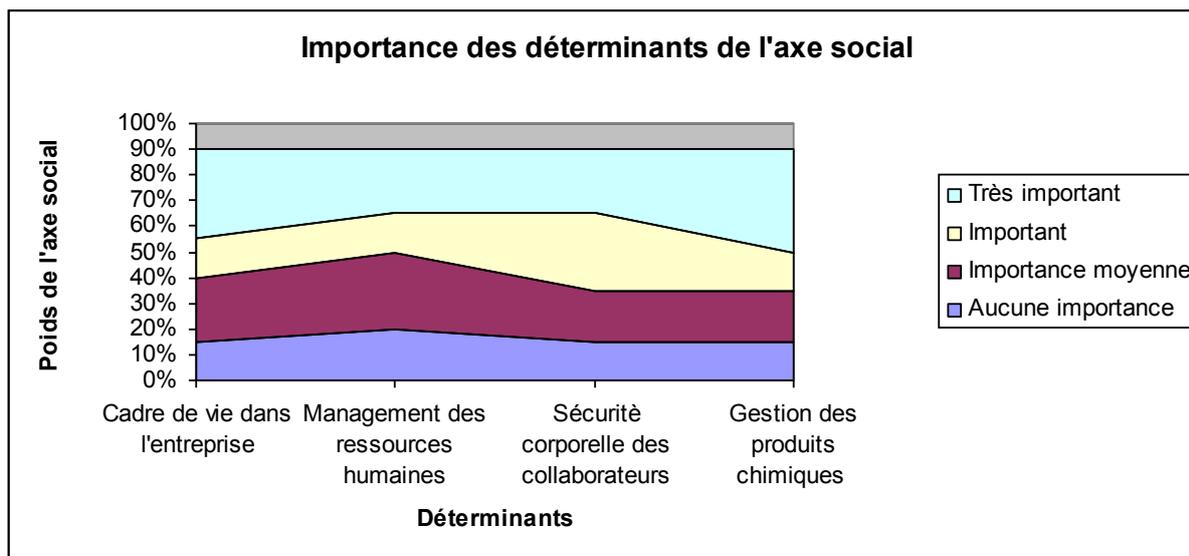
5.8   L'AXE SOCIAL

5.8.1   RÉSULTAT DE L'ENQUÊTE SUR L'AXE SOCIAL

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe social par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 5.   Les déterminants de l'axe social

Déterminants de l'axe social	Aucune importance	Importance moyenne	Important	Très important	Total
Cadre de vie dans l'entreprise	15%	25%	15%	35%	90%
Management des ressources humaines	20%	30%	15%	25%	90%
Sécurité corporelle des collaborateurs	15%	20%	30%	25%	90%
Gestion des produits chimiques	15%	20%	15%	40%	90%
Total Importance par déterminant	65%	95%	75%	125%	360%
Poids de l'axe social	18%	26%	21%	35%	100%

Fig. 6.   Importance des déterminants de l'axe apprentissage organisationnel

5.8.2   ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE SOCIAL

Les résultats de l'enquête montrent que les entreprises marocaines ne viennent que commencer sur l'application des exigences sociales, et le suivi de leurs indicateurs. Entre les entreprises enquêtées 35% en moyenne donnent une grande importance pour l'axe social, 21% en moyenne jugent que l'axe social est important dans leurs politiques de performance globale, 26% en moyenne ne donnent qu'une importance moyenne, et 18% en moyenne ne donnent aucune importance à l'axe social. Finalement, pas plus que 30% ont des indicateurs de suivi de l'axe social dans leurs entreprises.

5.9 L'AXE ENVIRONNEMENTAL

5.9.1 RÉSULTAT DE L'ENQUÊTE SUR L'AXE ENVIRONNEMENTAL

Le tableau ci-dessous montre l'importance donnée pour chacun des déterminants de l'axe environnemental par les entreprises du secteur du textile et de l'habillement au Maroc,

Table 6. Les déterminants de l'axe environnemental

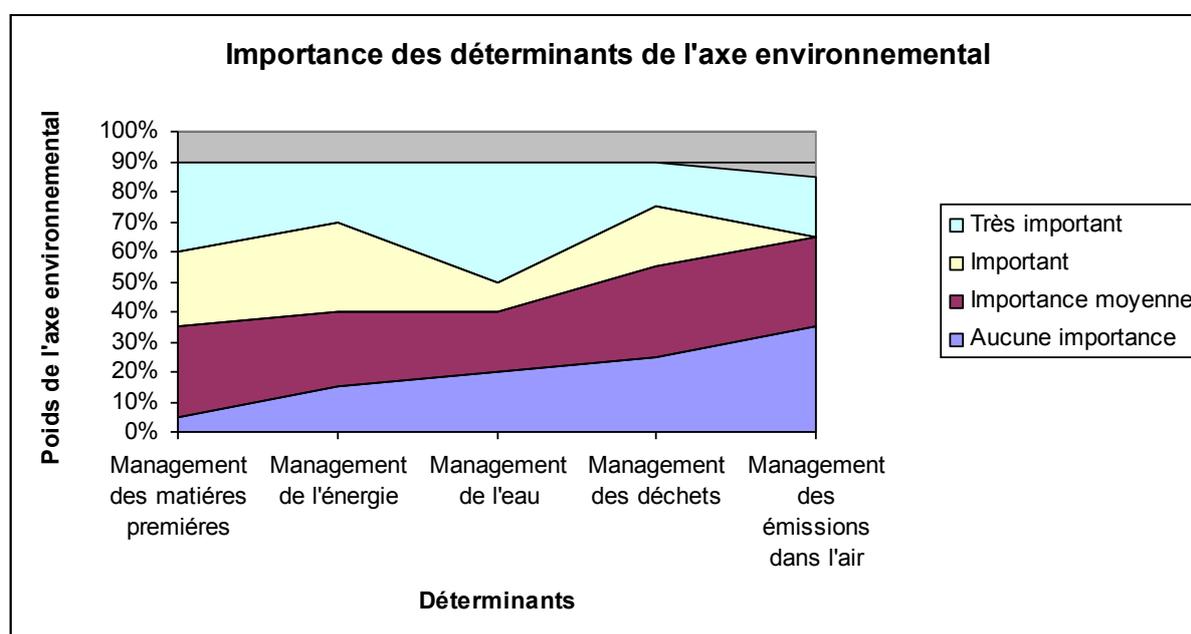| Déterminants de l'axe environnemental	Aucune importance	Importance moyenne	Important	Très important	Total
Management des matières premières	5%	30%	25%	30%	90%
Management de l'énergie	15%	25%	30%	20%	90%
Management de l'eau	20%	20%	10%	40%	90%
Management des déchets	25%	30%	20%	15%	90%
Management des émissions dans l'air	35%	30%	0%	20%	85%
Total Importance par déterminant	100%	135%	85%	125%	445%
Poids de l'axe environnemental	22%	30%	19%	28%	100%

Fig. 7. Importance des déterminants de l'axe environnemental

5.9.2 ANALYSE DU RÉSULTAT DE L'ENQUÊTE SUR L'AXE ENVIRONNEMENTAL

L'axe environnemental n'a pas lui aussi l'importance donnée à l'axe client et financier. 22% en moyenne jugent que cet axe n'a aucune importance dans leurs entreprises, 30% en moyenne lui donne une importance moyenne, 19% en moyenne seulement jugent qu'il est important, et 28% en moyenne donnent une grande importance à cet axe dans la gestion de leur

performance globale. Finalement, que 10% des entreprises enquêtées confirment qu'ils ont des indicateurs de suivi de la performance environnementale.

5.10 MANAGEMENT DE LA PERFORMANCE GLOBALE DANS LES ENTREPRISES ENQUÊTÉES

5.10.1 PILOTAGE DE LA PERFORMANCE GLOBALE

Les entreprises enquêtées ont confirmé que 80% des indicateurs de performance sont pilotés directement par la direction, et 65% des indicateurs sont pilotés par les responsables des départements (finance, production, supply, qualité…), 5% sont pilotés par les chefs d'équipes et 0% sont pilotés par les opérateurs.

5.10.2 SUIVI DE LA PERFORMANCE GLOBALE

Les entreprises enquêtées ont confirmé que 75% des indicateurs sont suivis par la direction directement, 60% des indicateurs sont suivi par les responsables des départements, 15% seulement sont suivis par les chefs d'équipes, et toujours 0% sont suivis par les opérateurs.

5.10.3 FRÉQUENCE DE DÉBRIEFE DES INDICATEURS DE LA PERFORMANCE GLOBALE

La fréquence de débriefe d'une entreprise à une autre change en fonction des indicateurs et en fonction des personnes qui les débriefent. 45% des indicateurs sont suivi d'une manière quotidienne, 55% hebdomadairement, 60% mensuellement, 35% trimestriellement, 30% semestriellement et 50% des indicateurs sont suivis annuellement.

5.10.4 APPLICATION DES PLANS D'ACTION SUR LA BASE DES RÉSULTATS DES INDICATEURS

Seulement 10% des entreprises enquêtées appliquent des plans d'action suite aux résultats des différents indicateurs de performance pilotés. 65% les applique souvent, 15% ne les applique que rarement.

5.10.5 QUALITÉ DES PLANS D'ACTION MIS EN PLACE POUR L'AMÉLIORATION DE LA PERFORMANCE GLOBALE

En posant la question : Est-ce que les plans d'actions mis en place dans vos entreprises sont ils SMART (Spécifiques, Mesurables, Atteignables, Réaliste et Temporelle), nous avons eu les réponses suivantes en moyenne pour chacune des qualité des plans d'action :

Table 7. Qualité des plans d'action appliqués dans l'entreprise

| Qualité des plans d'action	Jamais	Rarement	Souvent	Toujours	Total
Spécifique	0%	20%	50%	10%	80%
Mesurable	0%	15%	45%	30%	90%
Atteignable	0%	20%	50%	10%	80%
Réaliste	0%	10%	70%	10%	90%
Temporelle	0%	25%	30%	25%	80%
Total %	0%	90%	245%	85%	420%
Moyenne %	0%	21%	58%	20%	100%

20% seulement des entreprises jugent que leurs indicateurs sont toujours SMART, 58% les jugent souvent SMART, 21% des indicateurs les jugent rarement SMART. Ce qui montre le manque de l'aspect pertinence au niveau des plans d'action par rapport aux objectifs de la politique de l'entreprise. Quant à la pérennité des plans d'action, 0% jugent que leurs plans d'action garde une pérennité dans le temps, 25% les jugent comme bien au niveau de leurs pérennité, et 60% la juge comme moyenne. Finalement, les entreprises enquêtées ont déclaré qu'ils ont besoin d'un temps plus ou moins différents pour atteindre la performance globale, 40% ont jugé qu'ils ont besoin minimum 5 ans, 15% ont estimé le temps nécessaire de plus de 5 ans, 20% disent qu'ils ont besoin d'un minimum de 2 ans, et 10% seulement jugent qu'ils sont déjà sur la bonne voix au niveau de la performance globale.

6   CONCLUSION DE L'ENQUÊTE

Ci-dessous un récapitulatif des résultats de l'enquête par axe de performance :

Table 8.   L'importance des axes de la performance globale

Déterminants de la performance globale	Aucune importance	Importance moyenne	Important	Très important	Total
Axe financier	1%	22%	26%	51%	100%
Axe client	1%	18%	30%	51%	100%
Axe processus interne	13%	29%	24%	33%	100%
Apprentissage organisationnel	19%	29%	17%	35%	100%
Axe social	18%	26%	21%	35%	100%
Axe environnemental	22%	30%	19%	28%	100%
Total Importance par axe	76%	155%	137%	233%	600%
Poids de la performance globale	13%	26%	23%	39%	100%
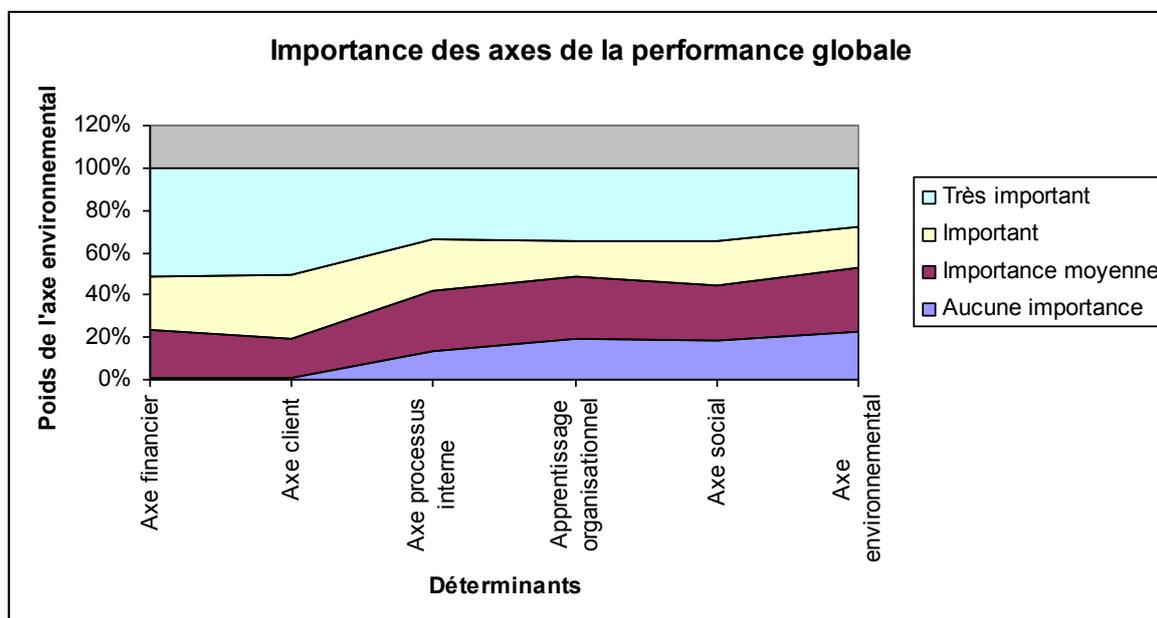
Fig. 8.   Importance des axes de la performance globale

Le tableau récapitulatif, et le graphique ci-dessus montrent le résultat de l'importance donnée pour la performance globale dans le secteur du textile et de l'habillement au Maroc. 13% en moyenne des entreprises ne donnent aucune importance à la performance globale, 26% en moyenne donnent une importance moyenne, et 23% en moyenne jugent que la performance globale et importante, et 39% jugent qu'elle a une grande importance dans leurs quotidiens. Ce résultat, ainsi que les autres chiffres détaillés plus haut, sur le pilotage et le suivi ainsi que les plans d'action mis en place suite aux indicateurs de performance suivis par les différentes entreprises montrent clairement que cette industrie a encore du chemin à parcourir pour qu'elle soit performante sur les différents axes, afin qu'elle assure sa pérennité dans un climat économique très incertains comme c'est expliqué dans le chapitre précédent, suite à la baisse des marges, l'augmentation des prix des matières premières et de l'énergie, les exigences des donneurs d'ordre en terme de qualité, délais, social et environnemental. Suite à ce résultat et ces contraintes, nous proposons comme perspective de cet article, un modèle de performance basé sur les six axes détaillés sur le questionnaire et qui représentent les axes du BSC, afin d'aider les entreprises du secteur à la connaissance des exigences relatives par rapport à chacun des axes, ainsi que la méthodologie d'application et de mise en place par un guide de maturité qu'on va établir en conséquence.

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AN OVERVIEW AND DESIGN OF DYNAMIC VOLTAGE RESTORER TO IMPROVE POWER QUALITY

Prasad A. Raut and Manohar N. Kalgunde

Department of Electric (Power system),
Sinhgad Institute of Technology,
Lonavala, Maharashtra, India

ABSTRACT: In recent years the most perceptible topic for electrical engineering is power quality. Basically, Power quality is simply the interaction of electrical power with electrical equipment. If electrical equipment operates correctly and reliably without being damaged or stressed, we would say that the electrical power is of good quality. On the other hand, if the electrical equipment malfunctions, is unreliable, or is damaged during normal usage, we would suspect that the power quality is poor. Voltage sag is one of most severe problem among the power quality issue. Despite being a short duration (10ms to 1s) event during which a reduction in the RMS voltage magnitude takes place, a small reduction in the system voltage can cause serious consequences. Nonlinear loads are major source of voltage sag. A load is considered non-linear if its impedance changes with the applied voltage. The changing impedance means that the current drawn by the non-linear load will not be sinusoidal even when it is connected to a sinusoidal voltage. Most commonly non-linear loads can be primarily found in heavy industrial applications such as arc furnaces, large variable frequency drives (VFD), heavy rectifiers for electrolytic refining, etc.

In this paper a dynamic voltage restorer (DVR) system is proposed to overcome from the problem of voltage sag. Dynamic Voltage Restorer is a series connected power electronics based device that can quickly mitigate the voltage sag in the system and restore the load voltage to the pre-fault value. This paper first gives an introduction to relevant power quality problems for a DVR and power electronics controllers for voltage sag mitigation. Thereafter the operation and elements in DVR is described. In this paper proposed utilizes the error signal to control the triggering of the switches of an inverter using Sinusoidal Pulse Width Modulation (SPWM) technique. Modeling and simulation of proposed DVR is implemented in MATLAB SIMULINK.

KEYWORDS: Dynamic voltage restorer, Power Quality, Voltage Sag, SPWM, Fault.

1 INTRODUCTION

Power distribution systems, ideally, should provide their customers with an uninterrupted flow of energy at smooth sinusoidal voltage at the contracted magnitude level and frequency Power system faults, switching of large loads or energization of transformers cause voltage disturbance. Such disturbances cause short term rapid change in amplitude of voltage. A sever disturbance in voltage may lead to system crash, hardware damage, affecting the cost of customers and utilities.[1] The problem quality problems such as temporary voltage rise (Swell) or voltage reduction (Sag) are more frequent and have severe impact on power system. Sudden increase in supply voltage up 110% to 180% in rms voltage is defined as swell . This occurs at fundamental frequency of network and sustains for time period of 10 ms to 1 minute. Typical system events such energization of large capacitor bank or removal of inductive load causes swells. On the other hand sudden decrease in supply voltage down 90% to 10% of nominal voltage is called as sag. This problem is for the short duration and for time period of 10 ms to 1 minute. The rated voltage is recovered after short period of time. Voltage sag is currently the most severe power quality problem encountered because of its adverse financial impact on customers. In Peninsular Malaysia, the first case of voltage sag was reported to the electric utility of Malaysia in early 1990 in which voltage sag

caused the stopping of electronic wafer fabrication process.[3]The power quality has serious economic implications for customers, utilities and electrical equipment manufacturers. Modernization and automation of industry involves increasing use of computers, microprocessors and power electronic systems such as adjustable speed drives .The power electronic systems also contribute to power quality problem (generated harmonics). The electronic devices are very sensitive to disturbances and become less tolerant to power quality problems such as voltage sags, swells and harmonics. Due to the harmonics are occurring in the system it causes losses and heating of motor. The DVR is a power quality device that has gained an increasing role in protecting industries against disturbances such as voltage sags related to remote system faults. The basic operation principle of the DVR is to inject an appropriate voltage in series with the supply through injection transformer whenever voltage sag is detected. To mitigate voltage sag, DVR has been considered as effective sag mitigation equipment and many research works have been carried out focusing in the design and control of the DVR. The main function of DVR is to inject the desired voltage quantity in series with the supply with the help of an injection transformer whenever voltage sag is detected. Power transfer ability, transient stability and damping of power oscillation is improved by using DVR in distribution system. And it is capable of generating or absorbing real and reactive power at its ac terminals. The basic principle of a DVR is simple by inserting   a voltage of desired magnitude and frequency, in order to restore the load-side voltage balanced and sinusoidal. This study introduce various power quality problems and basic concept of DVR (Dynamic Voltage Restorer). This study deals with overview of a Dynamic Voltage Restore (DVR) for mitigation of voltage sags.[4]

2   POWER QUALITY PROBLEMS, CAUSES AND EFFECTS

2.1   THE VARIOUS POWER QUALITY PROBLEMS ARE AS FOLLOWED

1.   Transients- A transient is a temporary occurrence of a fault which is of a very short duration in a system caused by the sudden change of state.

2.   Voltage sags- A voltage sag or voltage dip is a short duration reduction in rms voltage which can be caused by a short circuit, overload or starting of electric motors .A voltage sag happens when the rms voltage decreases between 10 and 90 percent of nominal voltage for one-half cycle to one minute.

3.   Voltage swells- Voltage swell, which is a momentary increase in voltage, happens when a heavy load turns off in a power system.

4.   Voltage interruption- Interruptions are classified as short-duration or long-duration variation. The term interruption is often used to refer to short-duration interruption, while the latter is preceded by the word sustained to indicate a long-duration. They are measured and described by their duration since the voltage magnitude is always less than 10% of nominal.

5.   Harmonics- Harmonics is the integral multiple of frequencies voltages and currents in an electric power system due to non linear loads. Harmonic frequencies in the power grid are a frequent cause of power quality problems.
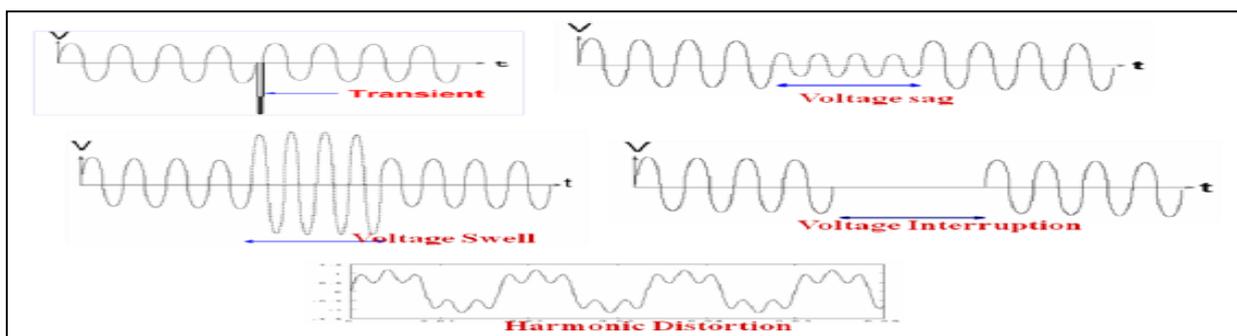
Fig. 1 Power Quality Problems

2.2   CAUSES OF POWER QUALITY PROBLEMS

Transient – Due to Lightning, Turning major equipment on or off, back to back capacitor energization.

Voltage Sags – Due to starting of large Motors, Energization of heavy loads, incorrect VAR compensation.

Voltage Swells – Energizing a large capacitor bank, Switching off a large load, incorrect VAR compensation

Interruption – Faults (Short circuit), Equipment failures, Control malfunctions (attempting to isolate electrical problem).

Harmonics – IT equipment, Variable frequency drives, Electro Magnetic Interference from appliances, fluorescent lighting, Arc Furnace (Any non linear load).

2.3 EFFECTS OF POWER QUALITY PROBLEMS

Transient – Tripping, Processing error, Data loss, hardware reboot required, Component failure.

Voltage Sags--Dim lights, Equipment shutdown, Data error, shrinking display screens, Memory loss.

Voltage Swells –Bright lights, Data error, shrinking display screens, Memory loss.

Interruption – Faults, Equipment failures, Control malfunctions

Harmonics – Line current increases, Losses increase, transformer and neutral conductor heating leading to reduced equipment life span.[7]

3 BASIC CONFIGURATION OF DVR

Power circuit and the control circuit are the 2 main parts of the DVR. There are various critical parameters of control signals such as magnitude, phase shift, frequency etc. which are injected by DVR.
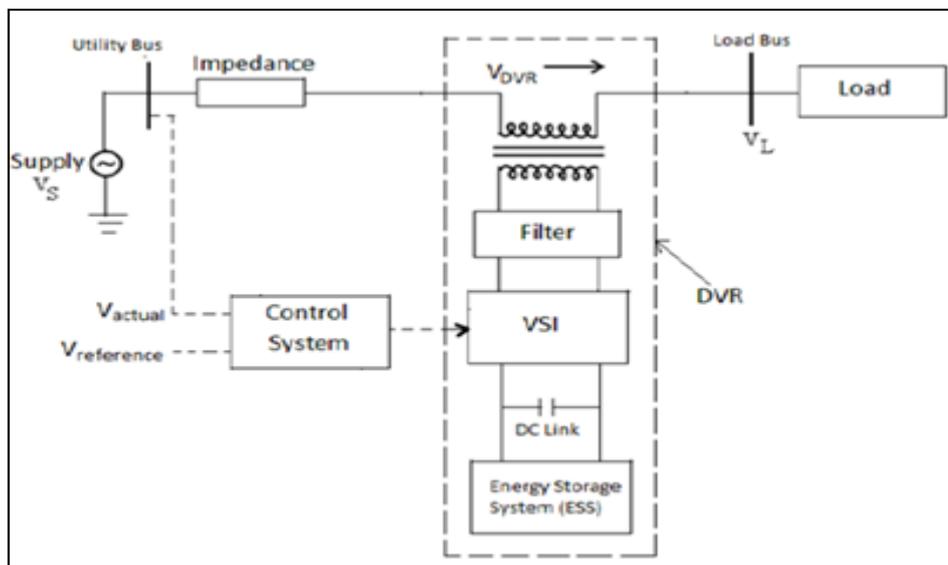

Fig.2 Basic Configuration of DVR

A Dynamic Voltage Restorer (DVR) is a recently proposed series connected solid state device that injects voltage into the system in order to regulate the load side voltage. Its main function is to monitor the load voltage waveform constantly by injecting missing voltage in case of sag. To obtain above function a reference voltage waveform has to be created which is similar in magnitude and phase angle to that of supply voltage. During any abnormality of voltage waveform it can be detected by comparing the reference and the actual waveform of the voltage. The DVR usually consists of an injection transformer, which is connected in series with the distribution line, a voltage sourced PWM Converter Bridge which is connected to the secondary of the injection transformer and an energy storage device connected at the dc-link of the converter bridge. A typical schematic of the DVR is shown in Fig.2 [8,9]. The converter bridge output is filtered before being fed to the injection transformer in order to nullify switching frequency harmonics. The series injected voltage with a variable amplitude, phase and frequency of the DVR is synthesized by modulating pulse widths of the converter bridge switches. The injection of an appropriate series voltage component in the face of a voltage disturbance requires a certain amount of real and reactive power supply by the DVR .The real and reactive power supplied by the DVR however depends on the type of voltage disturbance experienced as well as the direction of the DVR injected voltage componentwith reference to pre-sag voltage. The fidelity of the DVR output voltage depends on theaccuracy and dynamic behavior of the pulse width

modulated(PWM) synthesis scheme and the control system adopted. Traditionally, closed loop control PWM schemes have been used for various types of ac power conditioning systems. The general requirement of such control scheme is to obtain an ac waveform with low total harmonic distortion and good dynamic characteristics against supply and load disturbances. Although conventional sinusoidal PWM schemes and programmed optimal PWM schemes have performed reasonably well for linear loads, the voltage waveforms tendto get distorted for nonlinear loads.

4   SINUSOIDAL PWM-BASED CONTROL OF THE DVR

The sinusoidal pulse width modulation (SPWM) switching technique is used to control the AC output voltage by Comparing a sinusoidal reference signal with a triangular carrier wave so as to get the pulses per half cycle. Figure 1 shows the pulses generated by using the SPWM in which a carrier signal is compared with a modulating signal. The fundamental frequency is 50 Hz and the phase locked loop provides a voltage-synchronizing signal, which is multiplied by a switching frequency of 1650 Hz. Thus, the frequency of the voltage-synchronizing signal is 33 times the fundamental frequency of 50Hz. The carrier signal is converted into a triangular signal with amplitude between -1 to +1. [1]
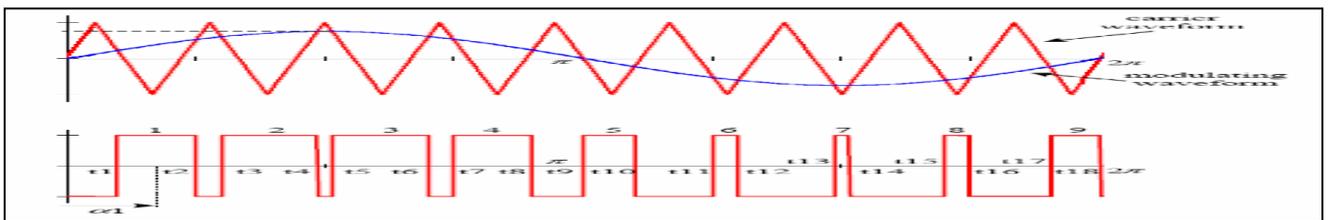
*Fig. 3. Sinusoidal pulse-width modulation*

The aim of the control scheme is to maintain a constant voltage magnitude at the point where sensitive load is connected under the system trouble. The control system only measures the rms voltage at load point in example, no reactive power measurements is required . The VSC switching strategy is based on a sinusoidal PWM technique which offers simplicity and good response. Since custom power electronics device is a relatively low-power application, PWM methods offer a more flexible option than the fundamental frequency switching (FFS) methods favored in FACTS applications. Besides, high switching frequencies can be used to improve the efficiency of the converter, without incurring significant switching losses. Fig. 7 shows the control scheme implemented in MATLAB. The DVR control system exerts voltage angle control as follows: an error signal is obtained by comparing the reference voltage with the rms voltage measured at the load point.[2]
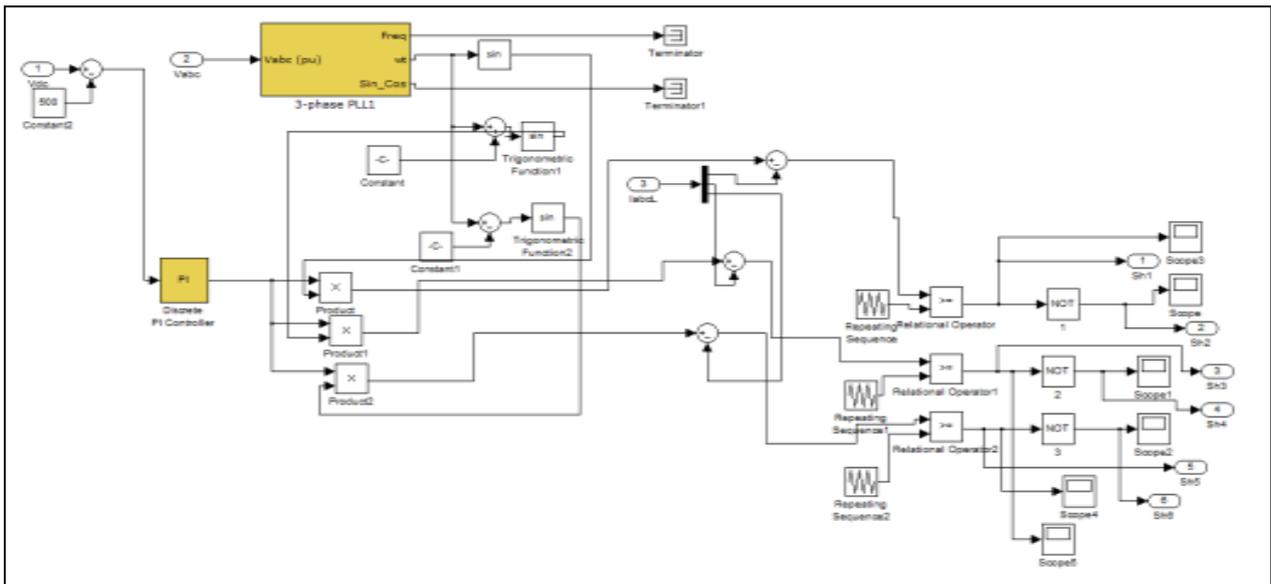
Fig 4 Simulink model of SPWM

The PI controller processes the error signal and generates the required angle δ to drive the error to zero, in example, the load rms voltage is brought back to the reference voltage. In the PWM generators, the sinusoidal signal, Vcontrol, is phase modulated by means of the angle δ or delta. The modulated signal, Vcontrol, is compared against a triangular signal (carrier) in order to generate the switching signals of the VSC valves. The main parameters of the sinusoidal PWM scheme are the amplitude modulation index, ma, of signal Vcontrol, and the frequency modulation index, mf, of the triangular signal.

5   TEST SYSTEMS AND DVR MODELS IN MATLAB
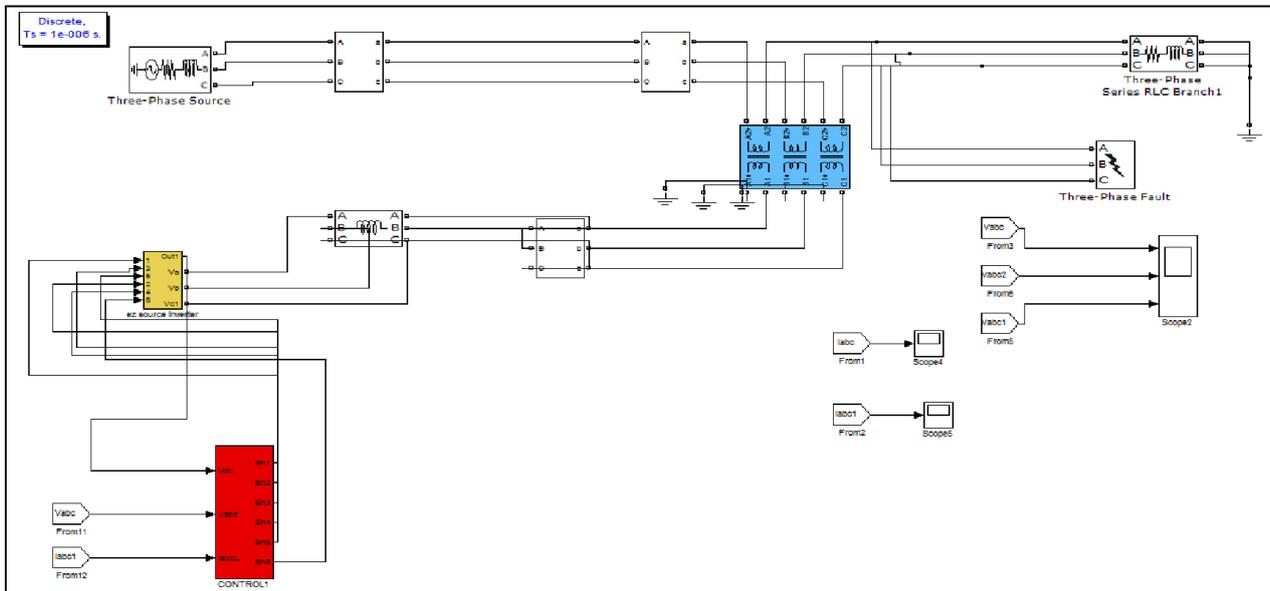
Fig 5 Matlab Simulink of Test System

Fig. 5 depict the test system implemented in MATLAB to carry out the simulations for the A fore mentioned mitigation technique. It consists of main components such as Source, injection transformer, three phase voltage source converter,controller. The test system comprises of a 15 kilovolt, 50 Hertz transmission system, represented in Thevenin equivalent, feeding into the secondary side of a 3-winding transformer. The load is connected to the secondary side of the transformer.The DVR is connected in series using transformers in delta to the lines. Fig. 5 will show the DVR in connected the test system.
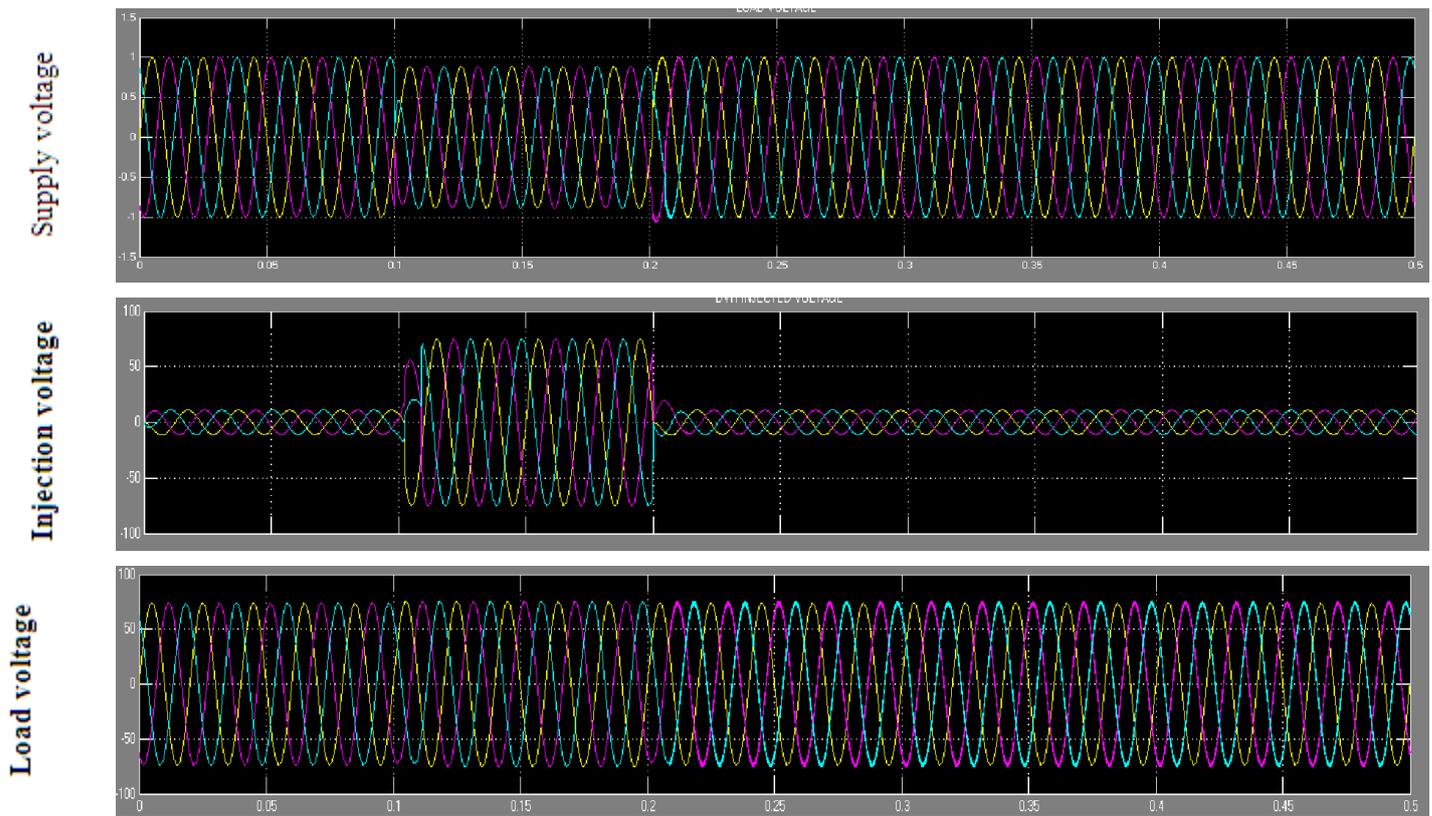
6   SIMULATION RESULTS

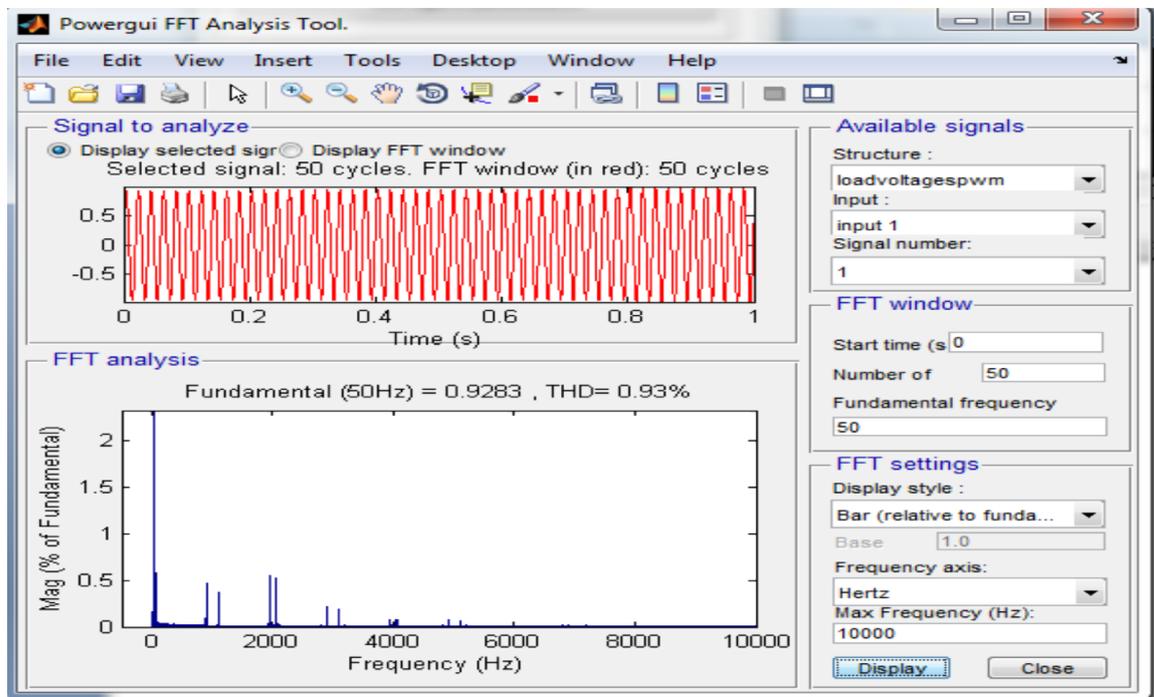*Fig. 6 DVR response to balanced voltage Sag*

Fig.7 waveforms of showing the FFT analysis of load voltage of spwm

To illustrate a typical response of injection transformer of DVR with the proposed control strategy, a simple 50 Hz power distribution system with a sensitive load as shown in Fig. 2 is considered. Basically three phase fault is created from 0.1 to 0.2

s which result in voltage sag on supply side as shown in supply voltage graph . The load voltage and the injected voltage by DVRare also shown in Fig. 6 As can be seen from the figure, the proposed control strategy is able to drive the DVR to inject the appropriate three phase voltage component with correct phase to remove the supply voltage anomalies due to three phase fault. It quickly injects necessary voltage components to smoothen the load voltage upon detecting voltage sag.

7   CONCLUSION

This paper has presented electromagnetics transient modelof power electronic based equipment DVR and that power quality characteristics were studied. Using the facilities available in MATLAB, the DVR several aspects of voltage sag mitigation study have been examined. First, a DVR using six-pulse inverter and three phase rms voltage measurement and sine wave PWM control was described. It presents excellent performance to protect critical loads against balanced voltage sags. When the DVR is in operation the voltage sag is mitigated almost completely, and the rms   voltage at the sensitive load point is maintained at about 90% . The PWM control scheme controls the magnitude and the phase of the injects voltages, restoring the rms voltage very effectively. The sag mitigation is performed with a smooth, stable and rapid DVR response. So, DVR can be widely applied in distribution power Systems.

APPENDIX

Main Supply Voltage Per Phase 15 kv, Line Impedance Ls = 0 .006 H , Rs=0.002Ω , Series Transformer Turns Ratio 1:1 , Load Resistance 40 Ω , Load Inductance 0.04 H, Line Frequency 50HZ, Inverter Specifications IGBT based 3 arms, 6 Pulse, Frequency =1080 Hz, Carrier Frequency=1024 HZ ,Sample Time= 0.5 sec.

FUTURE PROSPECTUS OF THE STUDY

(a)   The application of the model presented in this work may be extended to other power Electronics loads used in modern hi-tech industry.

(b)   The regenerative power system network consisting of an active load (such as photo voltaic system or wind turbine system) with better power quality and less power Disturbance using DVR can be explored.

(c)   Investigation of the multi-level of DVR can be investigated.

(d)   For this model of DVR auxiliary voltage supply is used instead capacitors can be used as a source and relative simulations can be carried out and studied.

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Challenges and Prospects for the Development of Alternative products in Morocco

Bouchra Radi and Imane Bari

Depart. : Sciences and Techniques of management,
Lab. : Finance, audit and Entrepreneurship,
Ecole Nationale de Commerce et de Gestion,
Ibn Zohr University,
Agadir, Morocco

ABSTRACT: The three financial techniques known under « Ijara », Murabaha » and « Musharaka » were introduced to Morocco in 2007 in the context of an international convergence towards Islamic finance. However, the integration of such techniques in traditionally-oriented Moroccan banks is facing various challenges. Marketing these products has proved to be limited. The present article targets the description of the so far adopted financial techniques and the analysis of the challenges they face, especially in terms of marketing. It also targets the provision of suggestions about their development through the synthesis of available studies as well as through a series of opinions given by bank managers, advisers and specialists in the realm of Islamic finance.

KEYWORDS: Moucharaka, Mourabaha, Ijara, financial crisis, alternative products.

1   INTRODUCTION

The number of Islamic Financial Institutions established worldwide has risen at once in 1975 to attain up to more than 300 in 75 countries. They have been regrouped in North Africa as well as in South East Asia (Bahrein and Malesia being major centers). They have also appeared in Europe and in the United States of America. The totals of their credit notes are worldwide . They accounted for 1000 billion dollars. The totals of their credit notes have increased at about 15% and 20% per year. Three reasons account for this. Firstly, a high number of Moslems lay a high claim for financial services in conformity with the Charia. Secondly, the rise of the petrolium manna has resulted into the improvement of investments being welcomed in the Golf Region. Competing financial Islamic products/ processes have attracted both Moslem and non Moslem investors.

No matter how hard I slamic banks have tried to operate in Morocco, they not been authorized to directly operate in a Moroccan context. The central bank, that is, Bank Al Maghrib (BAM, 2007 [1]) has faced internal pressures. Therefore, in October 2006, they developed the legal framework for the emergence of three products that were in line with the Sharia: Ijara, Mourabaha, and Moucharaka. In light of this short background, the present article purposes to study the Moroccan experience relating to this subject. Constraints placed on the commercialization of these three processes will notably be analyzed on the basis of the synthesis of already made studies as well as on the basis of qualitative data generated through soliciting the opinions of banking managers and of specialists dealing with Islamic finance.

Thus, the present study will start with the examination of the Moroccan banking sector, the enumeration of the ethics governing Islamic banking and the description of its advantages. It will then focus on the risks and the challenges encountered during the establishment of the system and on its progressive adaptation to particular needs.

2 THE DESCRIPTION OF THE MOROCCAN BANKING SECTOR

Economy cannot virtually develop unless it is given support by a financial sector which fully and efficiently collaborates with companies and the private enterprise. The Moroccan legislator targeted placing the banking and the financial system within a modern, open and evolutionary legal framework that has the propensity to adapt to different mutations. The objective is to reinforce the role of finance in the collection of deposits, in economy-funding and in the encouragement of investment endeavors in the private sector. As a matter of fact, the concretization of such aspirations have still been unsatisfactory due to the prevalence of intrinsic challenging factors within the system.

2.1 A HISTORICAL BACKGROUND OF THE MOROCCAN BANKING SYSTEM

The establishment of banking system-free market was initiated in 1991. Diverse measures were used for the achievement of this goal. The following measures were cases in point:

- The imposition of credit auditing as well as the substitution of direct quantitative control for indirect qualitative measures (Reserve fund, solvency ratio, liquidity, entity-risk).
- The establishment of a free market for interest rates on accounts payable, in addition to a gradually established free market for interest rates on debits. Here, two types of variable reference rates were accounted for: the first one was accounted for on a monthly basis. It was devised for long term payable accounts. The second one was accounted for on a year-basis. It was devised for medium and long term payable accounts.
- The elimination of obligated employments, those who are bound to gradually disappear being excepted
- The authority conferred to banking institutions to issue deposit certificates or securities whose life cycle vacillates between 10 days and 7 years. The reinforcement of their long productivity is a targeted objective.

Banking deregulation targeted the improvement of efficiency through setting three measures. While the first measure involved securing the best allocation of resources, the second measure involved the reduction of the costs of intermediation. The third measure involved the reinforcement of the role of the banking system in the collection of deposits. The objective was to give support to economic development, especially through the development of capital expenditures vote.

The 1993 banking law is relevant to this context. It targeted the enhancement of economic development through self-financing bank-based economy.

When banking-applications were suppressed in 1998, financial authorities started to pay heed to the reinforcement of inter-banking-competition. This endeavor was denoted through the reinforcement of the strength of the banking system as well as through significantly decreasing interest rates on debits (F. Oualalou, 2002 [2])

The 34-03-Law was adopted to make up for the challenging aspect of the 1993 law, especially with regard to the strong and outstretching roles played by public accountants. It extended to the appraisal of internal auditing system employed in the so far concerned institutions.

The banking-system-reform targeted the development of the efficiency of the financial sector. It aimed to make the most of financial channels following the development of competition and the establishment of an optimal allocation of resources. It equally aimed to contribute to the rise of productivity gains through the rationalization of banking and financial activity, the consecutive decrease of the cost of intermediation and the diversification of offer. In light of this, discounted banking notes can be divided into two categories. The first category relate to the modification of interest rates. The second category bears relevance to the allocation of resources. Thus, it would be possible to witness a decrease of interest rates through a devised margin instrument. Such decrease might have a positive bearing on investment. Meanwhile, the amelioration of the channels designed for financing economic endeavors is expected to lead to a better exploitation of benefits. This goal could be achieved through giving due consideration to the application of resources in the most interesting and productive locations. This can consequently result into the amelioration of the efficiency of national economy (Centre Marocain de Conjuncture, 2002 [3])

2.2 THE CHARACTERISTICS OF THE MOROCCAN BANKING ENVIRONMENT

Today, the Moroccan banking system is diverse in terms of the ownership of stocks, significant foreign ownerships being inclusive. The banking system is also characterized by a scale of integration. (The first four banks control more than 50% of the market). The inputs and the outputs in the sector are hardly frequent. The distribution of market-dividents are stable. They are controlled by a limited number of banks. Competition in terms of pricing is also minimal. The prevalence of certain

rate-auditing and the deficiency of the financial market create an environment where banks fail to compete with other sources of financing.

The supervision of banks is quite intense both at the level of the global system (the central bank) and at the level of the individual bank. Thus, the internal management practices of lending institutions face the challenge of excessive centralization. Actually, important decisions relating notably to Credit are dealt with by central services. Consequently, local offices get reduced to mere deposit collectors, retard Loan-granting channels and they disharmonize the redistribution of resources generated through the system. This is to explain why the best level of expertise in terms of risk-analysis is manifested at the level of head offices. Local offices by contrast demonstrate the absence of expertise. As a result, risk analysis becomes just a series of formal procedures when a loan is applied for. Eventually, possible errors might be redressed through the allocation of a guarantee (Conjoncture, 2005 [4]).

The concentration of the system and the weak aspect of incidental competition are given effect through the establishment of a free market. They can empower some especially small and medium sized firms and disadvantage others. In this context, it is worthwhile noting that small and medium sized companies face serious difficulties when they try to get banking loans. This is to say that their claims for loans are refuted, notably due either to the absence or the inadequacy of guarantees (estimated to be heavy). This might also be due to the absence both of reliable company activities and reliable entrepreneur. (F Mourji & A El Gourch, 2001 [5]). As a result, small and medium sized companies can neither provide finance for their operations, nor could make any investments.

Furthermore, small and medium sized companies have a very limited access to expert financing (leasing, factoring). Venture capital has been hardly developed and biased.

Besides, banks have proclaimed a high level of liquidity. liquidity reports/ total assets have almost doubled between 1998 and 2004. They rose from 62.7% to 120.8%. They made the most of the situation rather than drain into investment into the productive sector.

Today, the Moroccan financial market is characterized by sub-liquidity that amounts to 22,3 billion dirhams. This state of affairs reflects some persistent disequilibrium at the level of the loan market which has prevailed since 2007.

In 2009, the annual surplus generated by lending institutions increased by 5%. It hit 10,5% billion dirhams thanks to notorious banking net proceeds. Gross net proceeds were generated through gross margins and to some extent through a high level of the current market income. Following the 22% rise achieved in 2008, the totals of the contribution of loan institutions recorded a progression which amounted to 10, 7%. Owever, the average rate of accounts receivable in a state of awaiting delivery relevant to the sector remained stable in general. It was limited to just about 6% (BAM, 2010 [6]).

Moroccan banking institutions are hardly exposed to a financial crisis. The reason is that they mainly use a strict control system. They also tightly restrict the direct access of financial institutions to financing using foreign currency. Actually just about 3 or 4% of assets and liabilities managed through the banking system are denominated in foreign currency. Such assets generally take the form of deposits paid to foreign banks, especially French ones. Just a little money is invested in the treasury bill. A lesser amount of money is reserved for investments in captive finance companies established in conformity with the local expansion strategies of Moroccan banks.

At the level of loan chapters, non-resident deposits represent only 1% of the total deposits paid by clients. At the level of local inter-bank markets, bank- requirements in foreign currency are dealt with by Bank Al Maghrib. Average term loans lent by foreign banks are rare. New financial assets, especially those suggested for inclusion in Moroccan pension funds were timidly developed in 2007. They were in a state of gross stop loss when economy drew to a crisis (L Tayebi, 2009 [7]).

Real-estate loans and consumer credits chiefly benefit from support given by banks. Thus, consumer credits in particular can contribute to the improvement of consumption. However, they are considered as imported assets, the consequence of which is that local companies are placed at a disadvantage. This in turn results into serious commercial deficit.

The 80% of the population, the ones bereft of postal accounts excepted, do not resort to banks either because they are not well off, or because their professional status does not permit it or else because their religious creed stands in the way.

Thus, the banking rate imposed by Bank Al Maghrib corresponds to income generated through a series of accounts, including postal checking accounts and local credit unions open at Barid Al Maghrib. In light of this, the banking rate imposed by Bank Al Maghrib has involved 40% of the population in 2007. This is to say that a similar percentage is recorded by high standing countries. However, the recorded percentage is somehow estimated as inferior when it is compared to the percentage recorded by developed countries.

If Moroccan banks are wishful to develop the banking rate, they should reinforce and diversify their commercial offer. OMC (the international Organization of Commerce) signed an agreement in December 1997 on the abolition of restrictions imposed upon financial services. It was decided that the agreement be put into practice starting from 1999, whereby international operations undertaken by the 95% of diverse financial firms operating on the global market would benefit from the reduction of restrictions.

Although the number of international independent financial firms in Morocco is still scarce, the OMC (the international Organization of Commerce) incites banking institutions to get ready to face the challenge of international competition. It also incites them to adapt their structures to the new constraints of global financial markets.

3   THE FOUNDATIONS AND THE ADVANTAGES OF ISLAMIC BANKING

Islmic banking is based on direct intervention into the transactions for which it provides funding. It can be remunerated either for its qualitative characteristics as a condominium or for the income summary account of the project it might have funded (wheter it is a matter of loss or of gain) within the realm of Moudharaba or Moucharaka or else for deals received. Islamic banking can also be remunerated for renting properties. This is applicable in the case of Mourabaha technique, or in the case of Ijara technique (known under leasing/ rental-purchase) or in the case of Salam technique. Islamic banking is also remunerated for the manufacturing/ the construction of personal movables or real estates either by the Islamic bank itself or by a third party. This bears relevance to Istsina'a.

From an Islamic perspective, the general rule is that currency is solely a medium, a measurement-instrument characterizing the inter-exchange of products. Although currency ensures the prevalence of value-reserve, it cannot yield any surplus unless it is transformed into a real asset (Albaraka Bank, 2007 [8]).

However, Islamic finance adopts a particular strategy relating to loss and profit made by parties making a financial transaction. The Charia advocates that the investor (the lender) and the contractor (the receiver) equitably share profits and risks regardless of the financing method used. This indicates that the transmission of liability to just one party in the deal contradicts the ethics of the Charia. However some other financing methods appertaining to the traditional financial system is in line with the spirit of the Charia. It can be incorporated into an Islamic financial system. Other traditional financing methods, especially the classical debt contract, are excluded (E Jouini & O Pastré, 2008 [9])

Participation in company risks might be condusive to the need to establish a link between banks and companies. The link is supposed to be different from the one established by classical banks. As long as Islamic banks partake in projects, they might enter into partnerships with companies, especially if they experience concern for competition and performance. Thus, they might play the part of advisers and they might even assign the task to some of their company executives to directly partake in company management (M Zein, 1992 [10]).

The obligation to finance small and medium sized companies requires long and average term credits. It is also important to note that the development of small and medium sized companies requires that a strategy based on long-term resources be considered. As a matter of fact, commercial banks have always opted for short-term financing. They have carried on imposing important warrants because their resources are generated through demand or through term deposits.

However, it seems that products supplied Islamic banks need to adapt to the needs of small and medium sized companies. Four reasons account for this:

- Small and medium sized companies are short of capital. Such shortage sets a major obstacle in the way of having access to banking loans. Furthermore, Islamic financing places less focus upon cash contribution. It places a lesser focus upon guaranties than it is the case for classical banks. The problem is that excessive debt being the outcome of a shortage in terms of owner's equity generates important financial expenses. It threatens the financial health of small and medium-sized companies. Yet, Islamic financing does not permit the imposition of fixed interests. It lends a credit to the principle of sharing both losses and profits.
- A bank can impose its strengths and relations. Small and medium-sized companies cannot independently assert themselves upon the market. They are bound to experience important fluctuations in the procuration of inputs.
- A bank might not be imbued with a sense of confidence if it manages of a high number of small and medium-sized companies. To counter-act this tendency, Islamic financing establishes a partnership based on long-term relationships with small and medium sized companies. Of course, the bank is supposed to play a key-role in the management of the situation (see Musharakah). (I.B A, 2006 [11])

4   THE MOROCCAN SITUATION

A high number of Moroccans consider baking institutions to be at cross purposes with Islamic precepts. They would not resort to them unless they are extremely in need. Rather, they resort to alternative channels that offer loans exempt from interest relating, especially to financing real estates. The positive side of this sort of financing is that it complies with the principles of the Charia which forbids the conclusion of transactions generating an interest. However, because such practices are not subjected to any control by financial authorities, they might lead to fraudulent acts, to money laundering or to criminal or terrorist-activity-funding (E Jouini & O Pastré, 2008 [9]). Therefore, while Morocco's North African neighbors have permitted the introduction of Islamic Banks into their countries, Morocco has refuted many claims raised for them, (especially those suggested by the Qatar International Islamic Bank and the Noor Islamic Bank)

The truth is that Morocco faces the challenge of legislation adapted to the needs of Islamic banking. The actual contracts and obligation law has mostly drawn inspiration from French law. It just does not regulate contracts that relate to Moslem law. It is the same for company law.

Islamic Banks have achieved success in some Islamic countries, which Moroccan banks resist. For this reason, Moroccan Banks are lobbying in order to prevent the creation or the emergence of the Islamic banking system.

The Moroccan government does not encourage the establishment of Islamic Banks. The reason is that ethical regulations governing money and its management might result into the Islamization of commerce, of society and of politics (H Zaouali, 2005 [12]).

In 2006, BAM has surrendered to pressure exerted by banks and by the market. It has developed a legal context for the prevalence of three types of alternative products conforming to the requirements of the Charia which are Ijara, Mourabaha and Moucharaka. The goal was to enlarge the line of banking services and to contribute to the establishment of a better banking system.

Thus, the introduction of novelty relating to launching new financial products placed the focus exclusively upon financing rather than on deposits. However, According to BAM (Bank Almaghreb), Moroccans prefer to conclude transactions exempt from interest. Therefore, they are given two options at once. They can deposit their money in traditional banks in the form of non productive deposits. And because the 53% of of their deposits are in cash, they can also pay cash deposits.

The findings revealed that the number of demand deposits paid into Moroccan banks is rising. They recorded in June 2010 a positive variation surpassing last year's variation by 7%. Term deposits were rather slow. They surpassed last year's variation just by 8% (BAM, 2010 [6])

Therefore, the management of such deposits is regulated through prudential and accounting rules devised by BAM. Interestingly enough, the measures taken for the management of risks are identical to the ones taken for the management of risks associated with traditional products. Furthermore, for such products to adapt to international standards, contracts evolving round offer were ratified depending on rules enacted by AAOFI (the Accounting and Auditing Organization for Islamic Financial Institutions).

5   RISKS AND CHALLENGES FACING THE ESTABLISHMENT AND THE ADAPTATION OF A GRADUALLY ESTABLISHED FINANCIAL CONTEXT

The success of I slamic products depends to a larger extent on a series of factors prevailing at banking institutions. Co-contracting banks deal with infrequent risks where a selling contract is ratified. A series of risks associated with the transfer of a property by the banker are not considered by traditional schemes. Legally speaking, this involves some serious risk-outcomes and it would be worth wondering whether the banker would necessarily accept the hidden-defects-guarantee. This state of affairs can be understood in the light of risks with which traditional bankers are not familiar. (A El Akhdari, 2008 [13]).

The multiplication of selling and buying transactions might result into the accumulation of registration risks. Operative risks increase. In addition, they might get nourished under the effect of legal risks which spring from contract-inflation. Besides, risks rise out of the application of ratified contracts. A Simple disbursement can engender them.

Actually, organizational slowness caused by insufficient flexible processes can retard the performance of Islamic banks which constitute a competitive advantage for Morocco today. As a matter of fact, systematic risks are accruing (A Hassoune, 2008 [14]).

Islamic finance is an integral part of ethical finance. And because it is grounded in religion, its activities are psychologically and socially-oriented. As a consequence, the reputation of the capital invested into it, its image, its credibility are intangible assets but they can also be powerful too as a source of risk. Reputation-risks can hardly be identifiable, discerned, quantifiable or be reduced (A Hassoune, 2008[14])

An Islamic financial system is also supposed to meet the challenges of common risks facing traditional banks too as intermediaries (granting loans, providing market, cash or operative services etc). It is also expected to meet the challenges of its own risks. It is important to note that the remuneration of investment deposits through punctuated profits can lead to a withdrawal risk, to a fiduciary risk and to transferred commercial risks (T Khan and H Ahmed, 2002 [15]).

Moroccan banks started to deal in Islamic products in October 2007. Such products denominated "alternative products" were successively and discreetly launched on justified grounds.

The structure of Islamic fund-mounting gives the chance to many owned properties to be bound for transfer. Each transfer of property leads to a transfer of a right (a tax imposition).

Interestingly enough, customers are attracted to Islamic products. However, when Islamic products are launched, they hardly experience flow because they are more expensive than classical products. Firstly, the profit rates required by the bank are set at their uttermost. The reason is that contrary to interest rates, prices are fixed and they cannot be subjected to any revision. Consequently, margins are generated at the expense of the customer. In light of this, the margins supported by clients are more valuable than those supported by customers in the context of traditional financing. (Qorchi, 2005 [16])

Furthermore, even though the Moroccan banking system is found to be one of the most developed systems in North Africa, it proves to be the most expensive banking system even when it is compared to traditional banking.

The analysis of prices used at the level of the Moroccan banking market has proved that alternative financing is more expensive than traditional financing at an average of 26%.

The situation is complex in so far as the two products denominated Ijara and Iqtinaa are concerned. Costs are averaged at 86% over classical products (Alaoui and Meftah, 2010 [17]).

Similarly, alternative products offered for sale have not up to now covered the Moucharakat product as it is difficult to estimate or to manage the risk that is supposed to be shared with the investor. The focus is solely placed either upon housing-financing or upon consumption products because they are not highly exposed to risk. In addition to this, the legal Moroccan framework was not as yet adapted to Islamic financing. Consequently, the problem of a double taxation rose. This phenomenon could concretely be perceived in the light either of a double payment of (Value Added Taxation/ (TVA imposed on the purchase of goods) or in the light of the right of a financial transfer or in the light of the right of registration when shares are transferred. Supplementary expenses have heavily weighed upon these products. They have somehow sanctioned them at the level of competition. (KPMG, 2010 [18]).

The product denominated Mourabaha is central in the alternative package. It faced a similar challenge because it consisted of a double transfer of property. Up to 2008, it was subjected to a double imposition in terms of the right of registration. This could occur either when goods are purchased by the credit institution or else when the final customer repurchases them. The final client is bound to pay accumulated financial expenses from the beginning up to the end. The 2009 financial law redressed this dysfunction through the application of registration law at the first instance of a purchase made by the bank. Thus, the purchaser would not be obliged to pay for the right of registration.

This and other products (notably Ijara) have been subjected to a Value Added Tax (TVA). A 20% rate averaging a rate imposed upon commercial deals as well as on the reimbursement of the principal capital and on bank margins was imposed.

Finance law decreased Value Added Tax (TVA) as late as 2010 at a 20 average being the rate imposed on financial operations by banks at the time. Contrary to habit, it was applicable on the benefit margins realized by the bank without any due consideration given to the principal amount of the debt contracted. Therefore, the taxation of alternative production will in this context conform to Classical rules. (RADI, 2007 [19])

Finance law dating back to 2000 established other fiscal reforms privileging alternative products. Thus, in the context of a Mourabaha contract, a remuneration paid in advance through a bank leads to the reduction of about 10% of the lump sum of the benefit realized by a wage earner. Thus, the treatment of purchases through a finance contract on real estate leasing has conformed to the method of financing the rights of registration.

Other problems arose. Islamic products were perceived as a threat to the prevalence of conventional ones. Besides, human resources in this context were insufficient at that time.

Banks and finance companies needed money to be lent to customers on the so far prevailing inter-banking markets. The problem was that while the concerned product conformed to the spirit of the Charia, the system was heterogeneous. For this reason, Moroccan religious theoreticians (denominated Oulama) were litigant about the legal characteristics of this line of products.

The debate evolving around the legitimate aspect of these products was re-launched. Alternative products were more expensive than those requiring an interest. Therefore, it was worthwhile wondering weather they were more licit than those requiring an interest, taking it for granted that Moroccan economy does not target the maximization of profits but just on average benefits. Besides, alternative products are legally bound to a police insurance on death. The Takaful Islamic insurance model is missing. Therefore, can it acquire the Islamic label?

In addition to this, Moroccan authorities have not established a national religious strong system of control which could conform to the spirit of the Charia. . Instead, they solicited the opinions of a foreign organisms known under (AAOIFI). This explains why the conformity of products to the spirit of the Charia could not be regularly performed. This accounts for the breach that has always separated theory from practice which might require that the adaptability of financing performances to particular standards be questioned.

To avoid getting the issue of conformity questioned, some banks have already started to establish "specialized" structures which are exclusively dedicated to the commercialization of alternative products. The latter will dispose of their own capital. They could even prove that their funds could be generated through margin products which conform to the spirit of the Charia (Dar Assafa institution being a case in point). This option is relevant at the technical level because it permits the agglomeration of alternative banking products in just one subsidiary, which could facilitate the establishment of specialized accounts being exempt of interest.

Findings revealed that alternative products are not given any publicity. Ads or pamphlets used for the advertisement of alternative products are scarce. Furthermore, access to banking agencies revealed that officials placed in charge of commercialization did not adapt a neutral stance towards the two types of products. Rather, they usually recommend that customers solicit classical products.

Likewise, alternative contract products have proved to be highly unreliable. Here is an illustration of this observation:

- It is not possible to negotiate a commercial margin as it is the case for interests.
- the police-insurance is paid depending on the total amount of the financed good including the amount paid by the customer.
- If the customer passes away, the paid for good is not automatically deferred to his/her inheritors unless it is subjected to a complicated procedure proclaiming ambiguous requirements.

During an international financial period, an Islamic product can give the chance to national economy to experience new opportunities and to develop banking. At the international level, deep mutations occur giving the chance to these products to take roots and to prosper. Therefore, the national banking system could make the most of this situation. It could be reconsidered in ways that could permit a better integration of Islamic finance into Moroccan economy.

6 CONCLUSION

Islamic products are costly and are hardly given any publicity. However, they have been highly solicited by a high number of Moroccan customers. The number of the files demonstrating claims for the Mourabaha-product has almost doubled between 2008 and 2009. They rose from 2768, (that is, 344 million dirhams) to 4081 files, (that is, 457 dirhams).

Therefore, it is worthwhile noting that in addition to the three Islamic products being so far commercialized, which are Mourabaha, Ijara and Moucharaka, two other new products designed for companies will be launched by BAM and the Groupement Professionnel des Banques. They are denominated Salam-contract and Al Istisnaa. Salam-contract is suitable for the provision of financing to artisans and to agriculturists. Al Istisnaa is somehow similar to leasing. It could be suitable for professionals. It might involve both movables and real estates.

However, Launching the two new products cannot be achieved unless they are subjected to a fiscal treatment achieved through the collaboration of taxation-management. This poses the problem of expertise in the field. Henceforth, Morocco is expected to contribute more efforts in terms of training that meets the challenges of Islamic financing as well as taxation and judiciary reforms.

Certainly, the establishment of specialized structures relevant to Islamic products can benefit their commercialization. It can also increase the rate of banking economy. Therefore, Morocco needs to re-examine its dealing with Islamic banks.

Traditional banking subsidiaries cannot really substitute for Islamic banks because they commercialize just five products in the least (which are Mourabaha, Ijara, Moucharaka, Salam and Istina'a). The line of products offered by Islamic banks is larger. In addition to this, part of the population might refuse to have recourse to these subsidiaries due to a heterogeneous system.

Broadly speaking, Islamic banks might contribute to the creation funding input that might result into the development of investment, hence, to the development of the country. The actual banking system has failed to do so.

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Les Conventions de protection du milieu marin

[Conventions protecting marine environment]

Léonelle Flore NGUINTA HEUGANG[1-2]

[1]Attachée de recherche, Centre National d'éducation, Ministère de la Recherche Scientifique et de l'Innovation, BP : 1721 Yaoundé, Cameroun

[2]Doctorante en droit public à l'université de Yaoundé II (Soa), Cameroun

ABSTRACT: Environment can be understood as the space where human live and on which depend the quality of their life and health, taking into account those of future generations. Some environment components are: property which forms part of cultural heritage, characteristic aspects of landscape, rocks, air, soil, under soil, fauna, flora, forests, water, and sea. Use and management of sea resources are under specific prescriptions.

KEYWORDS: environment; international laws; safeguard; resources; water.

RÉSUMÉ: L'environnement peut se définir comme l'espace où vivent les êtres humains et dont dépendent la qualité de leur vie et de leur santé, y compris pour les générations à venir. L'environnement comprend entre autre les biens qui composent l'héritage culturel, les aspects caractéristiques du paysage, les roches, l'air, les sols, sous-sols, la faune, la flore, les forêts, l'eau, les mers. L'exploitation et la gestion des ressources de cette dernière catégorie font l'objet d'une réglementation Spéciale.

MOTS-CLEFS: environnement ; lois internationales ; sauvegarde ; ressources ; eau.

1   INTRODUCTION

Mars 1967, le Torrey Canyon déverse sa cargaison de pétrole dans la mer entre la France et la Grande Bretagne provoquant ainsi une marée noire très médiatisée ; les oiseaux englués et les plages noires frappent les consciences. Il en résulte la conclusion de certains traités visant à prévenir ce genre de catastrophe[1]. Mais ce n'était que le début car en Mars 1978 arrive l'Amoco Cadiz dont les conséquences sont plus graves que la première et le coup de grâce est donné onze ans plus tard par l'Exxon Valdez qui frappe de plein fouet les plus belles zones de l'antarctique aux Etats Unies. La protection du milieu marin devient dès lors une préoccupation mondiale. D'autres Conventions sont signées à cet effet. C'est le cas de la

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[1] *L'instar des Conventions de Bruxelles des 29/11/1969 et 18/12/1971 sur la réparation des dommages causés à l'environnement, de la Convention pour la prévention de la pollution par les navires (MARPOL) du 2/11/1973 et la Convention sur la prévention de la pollution marine d'origine tellurique du 04/06/1974)*

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convention des nations unies sur le droit de la mer (CNUDM) qui impose aux Etats en son article 192 « de protéger et de prévenir le milieu marin »

La notion de milieu marin est un concept qui inclut la qualité de l'eau en mer, sur la côte, dans les estuaires et prend en compte les ressources biologiques, la flore et la faune marines, les écosystèmes et l'habitat des espèces.

Protéger ce milieu c'est le préserver, le mettre à l'abri d'un inconvénient, bref garantir son existence. Le mot qui en découle est protection qui est l'action de protéger ou mieux les dispositifs et les institutions qui protègent.

La convention peut se définir comme un accord, pacte, contrat entre deux ou plusieurs personnes ou ce que l'on a tacitement convenu d'admettre. Au plan international, c'est un accord officiel passé entre deux ou plusieurs sujets de droit. Elle pose des principes et nécessite une coopération, crée des droits et obligations à l'égard des parties contractantes pour qui elle sert de loi selon le principe reconnu du « pacta sunt servanda[2] »

Les Conventions de protection du milieu marin. Quelles sont ces Conventions ? Par quoi sont elles concernées ? De quelle manière sont-elles effectives ? Bref comment ces accords garantissent-ils l'existence du milieu marin ?

Etant l'un des milieux vitaux dans lesquels l'homme tire une partie de sa subsistance, il est l'objet de nombreuses attentions. Il convient dés lors de détailler les Conventions qui le protègent (I) avant d'étudier leur effectivité (II).

2 LA CLASSIFICATION DES CONVENTIONS DE PROTECTION DU MILIEU MARIN

Nous les étudierons en fonction de leur objet (A) et de leur étendue (B)

2.1 EN FONCTION DE L'OBJET

Nous avons les Conventions qui luttent contre la pollution. On entend par pollution « l'introduction directe ou indirecte, par l'homme, de substances ou d'énergie dans le milieu marin, y compris les estuaires, lorsqu'elle a ou peut avoir des effets nuisibles tels que dommages aux ressources biologiques et à la faune et flore marines, risque pour la santé de l'homme, entrave aux activités maritimes, y compris la pêche et les autres utilisations légitimes de la mer, altération de la qualité de l'eau en mer du point de vue de son utilisation et dégradation des valeurs d'agrément[3] » sous toutes ses formes (1) et celles qui protègent la diversité marine (2)

2.1.1 LES CONVENTIONS QUI PROTEGENT LE MILIEU MARIN CONTRE LES DIFFERENTES FORMES DE POLLUTION

Les pollutions sont de divers ordres : océaniques, telluriques, atmosphériques etc.

S'agissant des pollutions par les navires (bâtiments en mer, engins fixes ou flottants) on a :

- La convention pour la prévention de la pollution par les navires signée à Londres le deux novembre 1973[4] appelée convention MARPOL[5] qui a pour objectif de préserver le milieu marin en assurant l'élimination de la pollution intentionnelle[6] par les hydrocarbures et autres substances nuisibles et en minimisant le déversement accidentel de ces substances.

- La convention internationale pour la sauvegarde de la vie humaine en mer (SOLAS) signée à Londres le premier novembre 1974 qui édicte des règles de construction, d'équipement et de fonctionnement des navires visant à améliorer la sécurité maritime.

S'agissant de la pollution par hydrocarbure ou autres substances dangereuses, il ya :

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[2] C'est ce qui ressort de la lecture de la convention de vienne sur le les traités
[3] Article 1 alinéa 4 de la Convention de Montego Bay sur le droit de la mer (10/12/1982)
[4] Amendée par le protocole du 17 Février 1978. La signature d'un règlement international en 1972 pour prévenir les abordages en mer.est à signaler
[5] Elle ne s'applique pas aux navires de guerre
[6] Déversement opérationnel

- La convention sur l'intervention en haute mer en cas d'accident entraînant ou pouvant entraîner une pollution par les hydrocarbures signée à Bruxelles le 29 novembre 1969[7] qui couvre les substances dangereuses édicte les mesures à prendre à l'encontre du navire accidenté.

- La convention de Bruxelles de 1969 relative à la responsabilité civile pour les dommages dus à la pollution par hydrocarbure impose un régime de responsabilité sans faute à la charge du propriétaire du navire qui est obligé de s'assurer. Pour la seconder, les Etats ont signé une autre Convention en 1971 sur la création d'un fonds international d'indemnisation (FIPOL) pour les dommages causés par cette pollution.

- La convention relative à la pollution marine par le pétrole du 30 Novembre 1990 qui impose aux Etats parties d'avoir à bord de leurs navires un plan d'urgence et prône le principe pollueur payeur.

S'agissant des pollutions par immersion des déchets on peut citer :

La convention sur la prévention de la pollution des mers résultant de l'immersion des déchets du 29 décembre 1972 qui vise à réglementer internationalement les rejets délibérés dans la mer à partir des navires et aéronefs. Elle prescrit des recommandations en fonction de la dangerosité des déchets[8].

- Un protocole du 2 mars 1983 interdit l'incinération des déchets toxiques en mer.

S'agissant des pollutions d'origine telluriques (provenant de la terre par cours d'eau, de ravinement ou d'écoulement par émissaires [9](KAMTO (M [1]) nous avons :

- La convention sur la prévention de la pollution marine d'origine tellurique du 4 juin 1974[10] qui s'applique à l'atlantique du Nord –Est et à une partie de l'océan arctique. Aux termes de l'article 4 les parties éliminent la pollution des mers d'origine tellurique par les substances dangereuses[11] et limitent strictement la pollution par les substances moins nocives[12]. Les substances radioactives font l'objet d'un contrôle rigoureux.

- La convention OSPAR[13] qui met en place des mesures rigoureuses de prévention à la source, favorables à une gestion durable du milieu marin pour les générations présentes et futures.

Il est à noter que la vie marine se concentre généralement dans les zones côtières où les écosystèmes favorisent la plus grande diversité biologique. C'est pourquoi le droit international de l'environnement protège également les côtes contre les pollutions d'origine maritime (à travers les Conventions entre autres de sécurité des navires et de prévention de la pollution marine) et terrestre (avec la convention de Barcelone du 16 février 1976[14] relative à la protection de la mer méditerranée contre la pollution, la Déclaration de Washington sur la protection de l'environnement marin contre les pollutions provenant des activités terrestres et l'Agenda 21 en ses articles 17 et 18). La protection des côtes passe aussi par la création des aires protégées et l'aménagement du littoral[15]. Au niveau national des parcs marins et réserves écologiques ont vu le jour.

A côté des Conventions qui protègent les mers contre les pollutions on a celles qui préservent la diversité marine.

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[7] *à laquelle s'est ajouté 1 protocole (2 novembre 1973)*

[8] *Confère Annexe l dit « liste noire » qui interdit l'immersion des substances très dangereuses (mercure, déchets radioactifs) ; Annexe II dit « liste grise » qui subordonne l'immersion d'autres substances considérées comme moins dangereuses (déchets contenant cuivre, plomb) à la délivrance préalable d'un permis spécifique. Il existe un permis général pour les substances n'étant pas dans les deux listes. Et Annexe III qui décrit le contenu des autorisations d'immersion.*

[9] *V. Kamto (M) Droit de l'environnement en Afrique. P.261*

[10] *Et un protocole du 26/03/ 1986*

[11] *Ex : mercure, huile persistantes*

[12] *Ex: cuivre, huiles non persistantes*

[13] *Fusion de la convention pour la prévention de la pollution marine dans l'atlantique Est (Paris : 22 septembre 1982) avec celle d'Oslo (1972) et de Paris (1974)*

[14] *Suivie de six protocoles dont certains portent sur : la protection de la mer méditerranée contre la pollution d'origine tellurique (1980), les aires spécialement protégées et la diversité biologique en méditerranée (exploitation du plateau continentale, du fonds et du sous sol de la mer),le transport transfrontalier de déchets dangereux (1996)*

[15] *A travers la convention de Ramsar sur les zones humides et celle du patrimoine mondiale (UNESCO) avec ses sites naturels.*

2.1.2 LES CONVENTIONS QUI PROTEGENT LA DIVERSITE MARINE

Elles protègent la faune (ensemble des animaux) et la flore (ensemble des végétaux) marines il s'agit de :

- Les Conventions d'Alger (1973) et de Bonn (1979) relatives à la protection de la flore et de la faune marines qui prescrivent que les Etats ont des droits souverains sur les zones relevant de leur juridiction. Mais en haute mer prévaut le principe de la liberté de pêche.

- La convention relative au commerce des espèces sauvages de la faune et de la flore menacées d'extinction (CTTES) signée le 3 mars 1973 à Washington qui instaure un contrôle strict des importations et exportations des espèces sauvages et de l'introduction à partir de la mer des spécimens appartenant à de nombreuses espèces animales et végétales marines.

- La convention d'Abidjan[16] du 23 mars 1981 relative à la coopération en matière de protection et de mise en valeur du milieu marin et des zones côtières de la région d'Afrique de l'ouest et du centre prévoit en son article 11 des « zones spécialement protégées » et impose aux Etats de prendre des mesures appropriées pour préserver les écosystèmes singuliers et fragiles ainsi que l'habitat des espèces et autres formes de vie marine appauvries, menacées ou en voie de disparition.

- La convention sur la diversité biologique de kuala lampur qui souligne la nécessité de prendre rapidement des mesures pour écarter les menaces pesant sur la diversité biologique marine telle que les monts sous marins, les bouches hydrothermales, les coraux d'eau froide et autres caractéristiques et écosystèmes marins vulnérables, relevant des juridictions internationale et nationale

- La convention de Bonn sur les espèces migratrices appartenant à la faune sauvage concerne les espèces menacées d'extinction protégées sur le territoire des Etats parties et ne pouvant être pêchées en haute mer. Des accords permettent la conservation des espèces telles que les phoques, les petits cétacés de la mer du Nord et de la Baltique.

- La convention internationale pour la réglementation de la chasse à la baleine dont l'objet est de créer un système de réglementation pour assurer la conservation et la mise en valeur des peuplements de baleine.

- Les Conventions sur la conservation des thonidés de l'Atlantique, sur la conservation des saumons de l'Atlantique Nord et dans le pacifique du Sud interdisent l'utilisation des filets dérivants et le transbordement des prises dans une zone déterminée.

Nous avons fini d'étudier les Conventions selon leur objet, qu'en est-il de leur étendue ?

2.2 EN FONCTION DU CHAMP D'APPLICATION

Autour de la convention de Montégo Bay qui est une convention générale, (1) gravitent des Conventions régionales (2).

2.2.1 LA CONVENTION INTERNATIONALE : LA CONVENTION DES NATIONS UNIES SUR LE DROIT DE LA MER CONNUE SOUS LE NOM DE CONVENTION DE MONTEGO BAY (CMB)

Signée le 10 décembre 1982, elle est entrée en vigueur en novembre 1994 ; elle comporte une partie 12 regroupant une cinquantaine d'articles consacrés à la protection et à la préservation du milieu marin. Elle règlemente l'environnement marin mondial en obligeant les Etats à l'utiliser équitablement et instaure un système d'aide des pays du Nord vers ceux du Sud. Elle regroupe les Etats des Nations Unies et reste ouverte aux autres

Si la C M B est la seule mondiale, tel n'est pas le cas au niveau local.

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[16] *Elle n'a pas encore été suivie de protocole.*

2.2.2   LES CONVENTIONS RÉGIONALES

En Europe nous avons :

- La convention en matière de lutte contre la pollution des eaux de la mer du Nord par les hydrocarbures (Bonn : 9 juin 1969) qui établit une coopération entre huit Etats européens [17](LAVIEILLE(JM) 2004 [2]) pour la lutte contre la pollution par les hydrocarbures et autres substances dangereuses avec une communication directe entre les services nationaux compétents.

- La convention d'Helsinki de 1992 qui a pour but d'éliminer les pollutions telluriques par une meilleure pratique environnementale et technologique.

- La convention de Bucarest du 21 avril 1992 qui concerne la protection de la mer noire contre les pollutions.

En Afrique nous avons ;

- La convention pour la protection et la mise en valeur du milieu marin dans la région des caraïbes (Carthagène des indes : 24 mars 1983) ; la convention de Nairobi sur la protection, la gestion et la mise en valeur du milieu marin et des zones côtières de l'Afrique orientale du 21 juin 1985.

- La convention sur la conservation des ressources biologiques de l'Atlantique sud-est signée à Rome le 23 octobre 1969.

Ayant fait un récapitulatif bien que non exhaustif[18] des divers accords internationaux visant à mettre le milieu marin à l'abri d'un inconvénient, il convient de se pencher sur leur effectivité.

3   L'EFFECTIVITÉ RELATIVE DES CONVENTIONS DE PROTECTION DU MILIEU MARIN

L'étude de leurs limites (B) suivra celle des mesures mises en place par les Conventions pour assurer leur suivi (A)

3.1   LES INSTITUTIONS CREEES PAR LES CONVENTIONS DE PROTECTION DU MILIEU MARIN POUR ASSURER LE SUIVI DE LEUR MISE EN ŒUVRE

Elles sont de deux ordres : juridictionnel (1) et non juridictionnel (2)

3.1.1   LES INSTITUTIONS JURIDICTIONNELLES PRECONISEES PAR LES CONVENTIONS DE PROTECTION DU MILIEU MARIN.

On a les instances nationales et internationales.

Au plan national, les appellations différent d'un Etat à un autre mais généralement il y a une hiérarchie ente les juridictions. Elles peuvent se prononcer sur les questions touchant l'environnement marin. Par exemple les juridictions françaises ont eu à se prononcer après la catastrophe de l'Amoco Cadiz. Elles ont donné raison aux victimes françaises en condamnant la société mère au paiement des dommages et intérêts.

Au plan international on peut citer le tribunal pénal international, la cour permanente de justice internationale, la cour commune de justice et d'arbitrage, la cour internationale de justice. Cette dernière a eu à se prononcer dans l'affaire Gabcikovo-Nagymaros opposant la Hongrie à la Slovaquie quant à l'utilisation du Danube dans laquelle elle a reconnu l'importance de l'environnement marin surtout, et sa nécessité à être protéger par tous.

Mais elles ont moins à faire que les autres.

3.1.2   LES INSTITUTIONS NON JURIDICTIONNELLES CREEES PAR LES CONVENTIONS DE PROTECTION DU MILIEU MARIN.

A côté des institutions communes à toutes les Conventions, on trouve celles qui sont spécifiques à chaque convention.

Concernant les institutions communes, on a :

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[17] *Lavieille (JM) : Droit international de l'environnement ; 2e éd. ellipses 2004 p126*
[18] *Car il est impossible de les citer toutes*

- La conférence des parties qui a pour fonction d'examiner l'application de la convention ; adopter les amendements ; les protocoles additionnels ; le budget ; faire des recommandations et sanctionner.

- Les secrétariats des Conventions qui, quelque soit leur degré d'autonomie exercent des fonctions d'administration, d'exécution, d'assistance, de coopération et de médiation. Elles peuvent faire des recommandations

- Les fonds : qui sont alimentés par les cotisations directes ou non des membres de la convention.

Concernant les institutions propres à chaque convention, on peut citer

- La commission baleinière internationale (CBI) qui assure le suivi de la convention de Washington sur la réglementation de la chasse à la baleine

- Le code maritime international des marchandises dangereuses (IMDG) élaboré pour faciliter la mise en œuvre de la convention SOLAS.

- La commission OSPARCOM qui surveille la mise en œuvre de la convention OSPAR.

Il est bien vrai que les Conventions se battent pour assurer leur mise en œuvre, mais elles ont encore beaucoup de lacunes.

3.2 LES DIFFICULTES RENCONTREES PAR LES CONVENTIONS DE PROTECTION DU MILIEU MARIN.

Elles sont internes (1) et externes (2)

3.2.1 LES DIFFICULTÉS INTERNES

Aucune convention ne réglemente les navires militaires encore moins les soutes des navires faisant l'objet d'une réglementation[19]. Idem pour certains autres domaines.

Certaines Conventions ne sont pas ratifiées (Londres : 19 mai 1900) ; d'autres pas encore entrées en vigueur (Kinshasa : septembre 1967), d'autres enfin ne sont pas suivies de protocole (Abidjan : 23 mars 1981).

Elles édictent des règles générales (applicables à tous sans distinction) et non contraignantes c'est -à -dire non assorties de sanctions. Et quand bien même il y en a, elles ne sont pas appliquées.

Il ya également un problème au niveau de la détermination de la responsabilité et la punition effective du coupable.

Enfin, à la lecture de ces diverses Conventions, on est toujours incapable de définir avec précision la notion de milieu marin. Quid des difficultés externes ?

3.2.2 LES DIFFICULTÉS EXTERNES

Elles semblent moins nombreuses que les premières mais elles sont plus vicieuses.

Déjà le sacro saint principe de la souveraineté interdit de donner des injonctions aux Etat.

Aussi les populations sont de plus en plus réticentes quant à l'application des Conventions de protection du milieu marin parce que non seulement leur marge de manœuvre est réduite mais aussi parce qu'en cas de problème, elles sont ignorées.

Enfin les sources de financement sont insuffisantes. Et le budget est parfois mal géré.

4 CONCLUSION

Certes il existe de nombreux accords internationaux qui visent à protéger le milieu marin ; mais il fait toujours l'objet d'une utilisation illicite et parfois illégale et ses ressources s'en vont diminuant ; tout cela à cause du manque de communications fréquentes entre les divers acteurs du droit international de l'environnement.

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[19] Comme c'est le cas avec l'olympique Bradi (1976)

Egalement, les Conventions doivent pouvoir édicter des règles assorties de véritables sanctions et donner les conditions à remplir pour être reconnu coupable d'une infraction contre la législation environnementale internationale.

Enfin, les champs d'action des Convention de protection du milieu marin doivent être élargis. Ainsi, des normes tant nationales qu'internationales ne peut-il pas surgir un droit d'ingérence maritime ?

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Design of High Efficiency Power Amplifier for 900 MHz GSM Application

Akash Sanjay Chavhan and Mahesh D. Goudar

Dept. of Electronics,
MIT Academy of Engineering,
Alandi, Pune, India

ABSTRACT: In this paper design of a wideband power amplifier is presented. The operating frequency of the power amplifier is from 880 MHz to 960 MHz. The circuit is designed using two 5 W GaN-HEMT. The Wilkinson power divider/combiner is used which is designed using microstrip line. The RF input applied to the power amplifier is divided into two using power divider. The RF signal is amplified in the two amplifier stages and combined. By using linear simulations, a GaN power amplifier circuit was optimized with the input and output return losses obtained as less than -15 dB. Isolation of the PA is approximately -30 dB and the maximum gain is 16.243 dB. The power amplifier is designed in Advanced Design System. The designed power amplifier is useful for GSM application.

KEYWORDS: Gallium Nitride, HEMT, wideband, microstrip line, power amplifier.

1   INTRODUCTION

Mobile phones and other means of wireless communication are getting popular rapidly. The number of cell phone users and amount of data traffic are increasing a much faster rate. The 2.5G networks provide data rates of upto 144 kbps, while 3G networks provide data rate of 384 kbps. The practical speeds for WiMAX and LTE ranges between 4 Mbps to 30 Mbps. In order to meet this increasing demand for communication traffic the next-generation systems are used by cell phone operators to replace old-generation cellular system. However this upgrading from present cellular system to next-generation system has a drawback of an increased power consumption of the equipment caused by increasing data rate and broadened bandwidth. Base stations and other equipments used for communication are the major power consuming components used by cell phone operators [1]. The PA alone consumes more than 50% of total power.

The class AB mode of transistor provides both high linearity and high efficiency. PA designed in class AB mode needs cooler heat sinks than the linear and well-behaved class A mode but this cannot be achieved without some nonlinear effects which can be avoided in some applications [2]. Microstrip resonators are used in both input and output matching networks and a tri-band GaN HEMT power amplifier is designed [3]. For individual frequency of operation two parallel resonators are used in series and a tri-band match network is implemented in similar fashion. A PA is designed using LDMOS employing a tunable matching network design based on varactor [4]. Two power amplifiers namely a class B and a class F are designed using a GaN HEMT device. By employing same bias conditions at 1.7 GHz class B amplifier provided a power added efficiency (PAE) of 69.2%, 39.9 dBm output power and gain of 14.9 dB [5].

The real frequency technique was used for designing output matching network and the bandwidth limitations of a Doherty power amplifier was addressed in [6]. The cascode and basic topology was used for implementing a two stage RF CMOS PA. Use of MOSFET only bias reduces the total dc current [7].The bandwidth limitation of Doherty PA was overcome by using the lower Q of a λ/4 transformer and introducing a phase compensation circuit and an additional offset line into the matching networks [8]. The single input Doherty PA designed in [9] was converted into a dual input Doherty which was found to provide higher efficiency bandwidth. An outphasing PA with improved performance was proposed even when operated in

high back off region [10].By using adaptive method for phase adjustment, the efficiency of a dual input Doherty PA was improved [11].

PA is a very important block in the transmitter architecture and it is required to have low power dissipation, small size, high gain and high efficiency. In this paper, we aim at designing a RF GaN PA for 900 MHz GSM base station application. The designing work is done in ADS (Advanced Design System) software from Agilent Systems using the concept of transmission line. This paper proceeds with the design methodology, the actual circuit schematic then simulation results are discussed and finally conclusions are drawn from the obtained results.
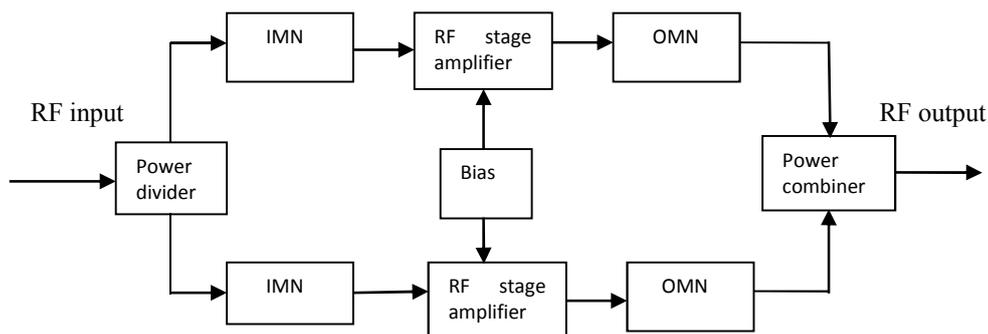
2   DESIGN METHODOLOGY

2.1   BLOCK DIAGRAM

Fig. 1 Block diagram of proposed RF power amplifier

The above figure shows the functional block diagram of the designed Power Amplifier. The main focus is towards providing all the things that are needed for the most critical transistor parasitic which affect microwave performance. Input matching network (IMN) and Output matching network (OMN) are used at input and output stage respectively to reduce return losses. There are two types of return losses namely input return loss and output return loss. Minimising these losses result in improved gain and output power. Input impedance is calculated using the ratio of input voltage and input current. From this ratio input matching is determined. At the input side passive elements with some impedance are connected which forms the input matching network. If the matching is not perfect some loss will occur at the input side. This loss is known as input return loss and it is denoted by S (1,1).Likewise, there is another term called output return loss which relates the loss occurring at the output side because of imperfect matching. It is denoted by S (2,2). IMN, OMN and RF staged amplifier are the main blocks in power amplifier. Here, Wilkinson power divider/combiner is used to to divide/combine the RF power. The complexity of the combining network is kept low. The circuit is operated in 900 MHz GSM (Global System for Mobiles) frequency band.

2.2   POWER DIVIDER

The power divider used in the design is the Wilkinson power divider.It has three ports ,Port 1 is the input port and port 2 and port 3 are the output ports. The two ports (port 2 and port 3) are isolated from each other by a 100 ohm resistor. This power divider provides a 3-dB split without any phase shift meaning the RF signal applied at port 1 will be 3 dB less at output ports. Transmission line is used for implementing the design. The two arms are usually made from λ/4 microstrip lines .The impedance of each arm is 70.7 ohms (i.e.$\sqrt{2}\,Z_0$) in a 50-ohm system. Here, Z_0 is the characteristic impedance. Microstrip line used for each of the three ports has impedance of 50 ohms. The impedance of microstrip line is determined by its width and it is independent of its length.
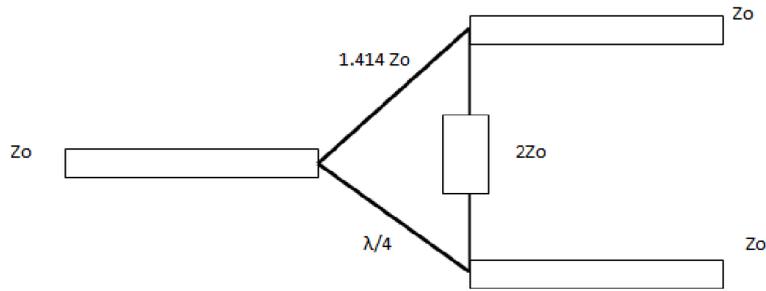
Fig. 2 Wilkinson power divider

2.3 AMPLIFIER STAGE

The transistor used for designing amplifier stage is a GaN HEMT (High Electron Mobility) from MACOM. Silicon Carbide D-Mode Transistor Technology is used for constructing this transistor. It is a wide band RF frequency transistor in which matching is not provided. It is designed for high voltage operation. It is small in size, low cost and light weight. The packaging used is a "true SMT" plastic package. 50V supply is required for its operation and can be used in applications where frequency of operation is from DC to 4 GHz. It is a device with common source configuration biased in class AB mode. Here, we choose class AB transistor as a compromise between the highly linear class A and highly efficient class B devices thereby providing excellent linearity as well as good efficiency.

2.4 INPUT MATCHING NETWORK

Radio Frequency Integrated Circuits (RFICs) cannot be realized without matching networks. Matching is required for amplifiers in order to maximize the output power. Every RFIC has its own input as well as output impedance. Here 50 ohm terminations are used at the input and output side before applying matching networks. The input matching is realized by using two capacitors and two inductors. The low pass filter at the input filters out harmonics. A DC blocking capacitor is also connected before the input matching network. Proper IMN is responsible for reducing input return loss. Ideally there should be no loss meaning no power should be reflected back at the input side .This ensures that matching is perfect.

2.5 OUTPUT MATCHING NETWORK

Output matching Network takes care of output return loss. It is also responsible for controlling the output power and gain of the circuit. Two inductors and three capacitors are used for designing OMN. For a properly designed OMN, there should not any loss. Practically this loss should be as small as possible.

2.6 POWER COMBINER

The RF signals from two stages of amplifier are added by power combiner. Wilkinson power combiner is used which increases the power of amplifier. Signal at the output of the power combiner is the desired RF signal.

2.7 BIAS CIRCUIT

For the simulation of circuit S-parameter model of the transistor is used. This s-parameter model is biased in itself so there is no need of connecting biasing circuit additionally. However, biasing circuit is required when the transistor is to be used in actual hardware. Separate bias needs to be applied to the gate and the drain terminals of the transistor.

3 SCHEMATIC DIAGRAM

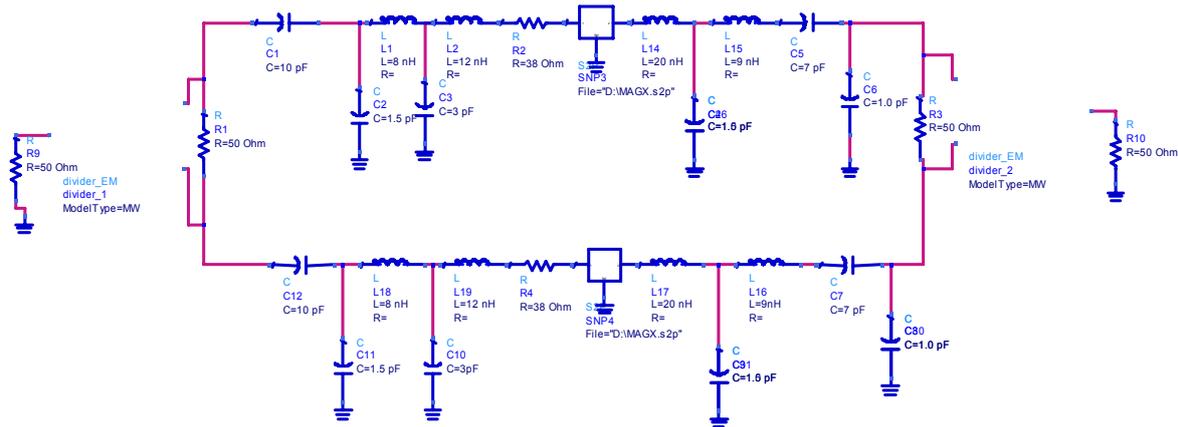Figure 3 shows the schematic of the designed RF power amplifier.

Fig. 3 Schematic of designed power amplifier

4   SIMULATION RESULTS AND DISCUSSION

For a circuit designed to operate at radio frequency, there should be no oscillations in the circuit. Presence of oscillations makes the circuit unstable so stability of the circuit must be ensured before using it in any application. Figure 4 shows the stability graph of the designed PA. The stability factor is 1.757 at 500 MHz. This ensures that the designed PA is stable.
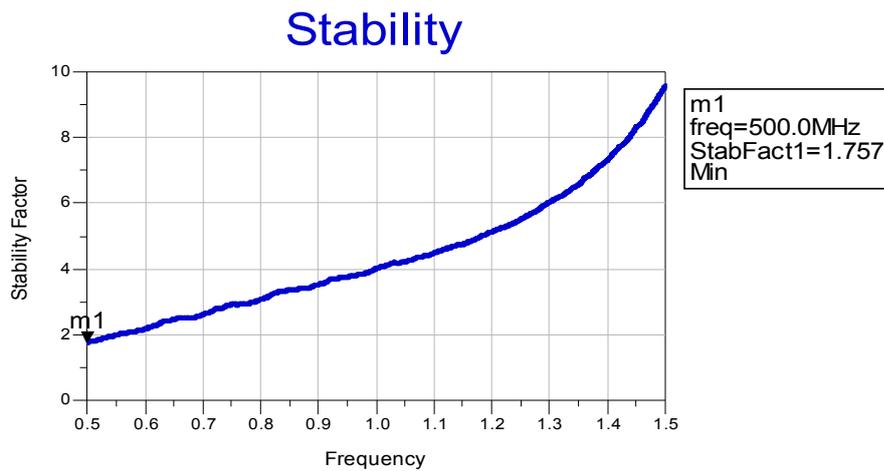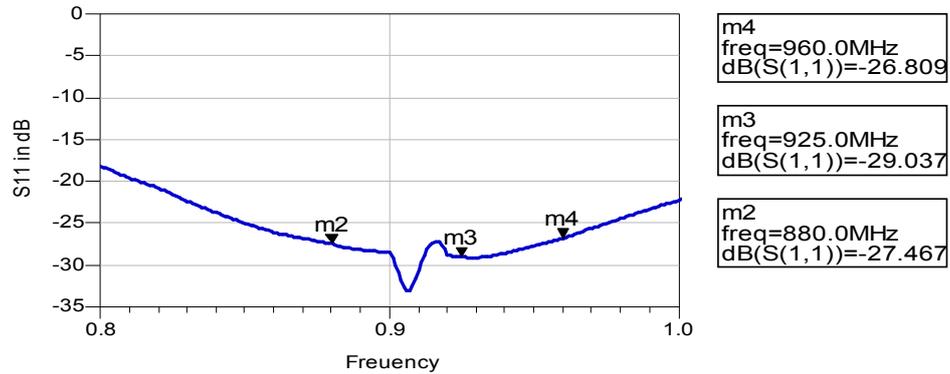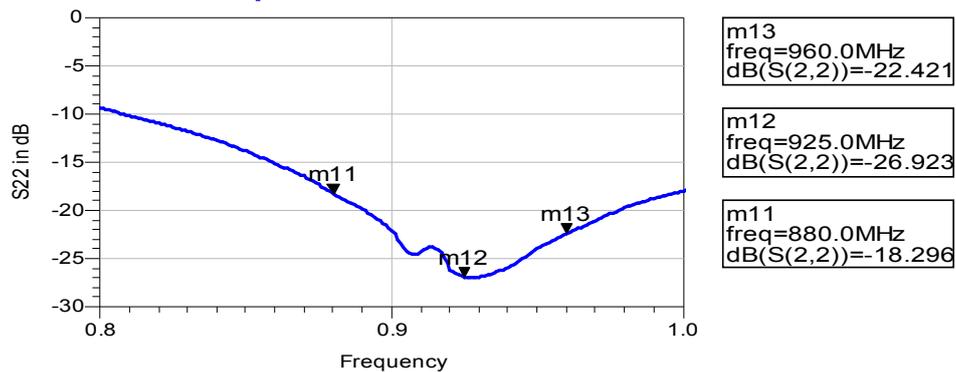

Fig. 4 Stability factor

Input return Loss

m4
freq=960.0MHz
dB(S(1,1))=-26.809

m3
freq=925.0MHz
dB(S(1,1))=-29.037

m2
freq=880.0MHz
dB(S(1,1))=-27.467

Fig. 5 Input Return Loss

S – Parameters are very useful for analysis of Power amplifiers. There are four s-parameters which are needed to be measured for observing the performance of a power amplifier. They are input return loss S(1,1), output return loss S(2,2), isolation loss S(1,2) and gain S(2,1). Input return loss is defined as the ratio of amount of power reflected back to the amount of power transmitted from the source at the input. It is also known as input reflection coefficient. Ideally we want no reflection of power at the input during transmission. Practically zero reflection is not possible to achieve, however it should be as low as possible. As shown in figure 5, the input return loss of this amplifier at 880 MHz is -27.467 dB which means that 4.23 % of transmitted power is reflected back at the output side and at 960 MHz it is -26.809 dB which means 4.56 % of transmitted power is reflected back. Output return loss is defined as the ratio of amount of power reflected back after transmission from the antenna at the output side. It is also known as output reflection coefficient. In figure 6, the output return loss at 880 MHz -18.296 which means that 12.167 % of transmitted power is reflected back at the output side and at 960 MHz it is -22.421 dB which means 7.566 % of transmitted power is reflected back.

Output Return Loss

m13
freq=960.0MHz
dB(S(2,2))=-22.421

m12
freq=925.0MHz
dB(S(2,2))=-26.923

m11
freq=880.0MHz
dB(S(2,2))=-18.296

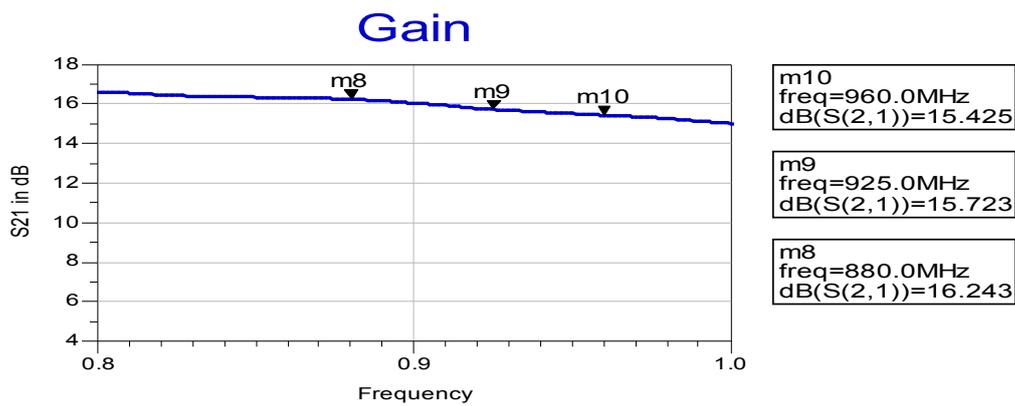*Fig. 6 Output Return Loss*
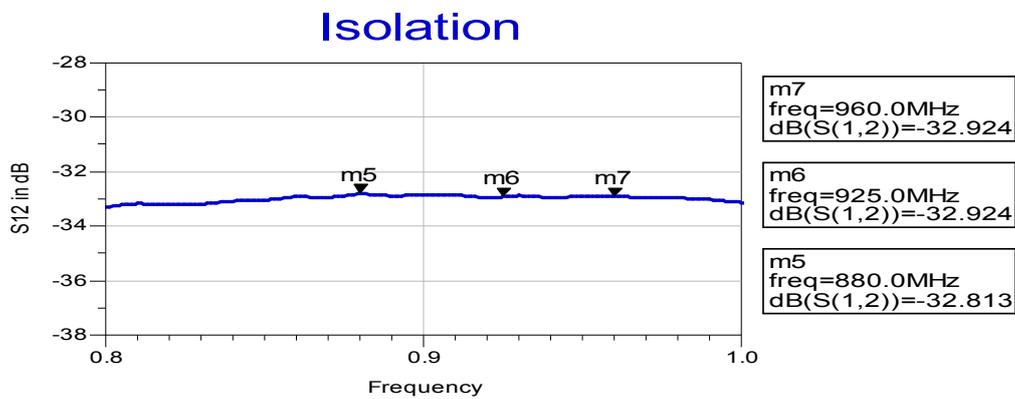
Gain

Fig. 7 Gain

Isolation

Fig. 8 Isolation

Gain of the PA is defined as the ratio of output voltage to input voltage. It is also known as forward transmission coefficient. It gives the amount of gain obtained at the output with respect to input. In figure 7, the gain is observed to be 16.243 dB at 880 MHz and 15.425 dB at 960MHz. Figure 8 shows the graph of isolation loss and at the desired frequency range it is observed to be less than -32 dB which means that there is approximately 100 % isolation between input and output. Isolation graph tells how well the output of the circuit is isolated from the input. Figure 9 shows the smith chart for input and output matching networks. It indicates how well the input and output are matched. From the smith chart it can be seen that the S(1,1) and S(2,2) graphs are well near the resistive line indicating good matching between input and output. This PA is designed to deliver output power of 10 W. All the simulations were performed using s-parameter palette. The values of frequency sweep goes from 500 MHz to 1.5 GHz with a step size of 1 MHz.
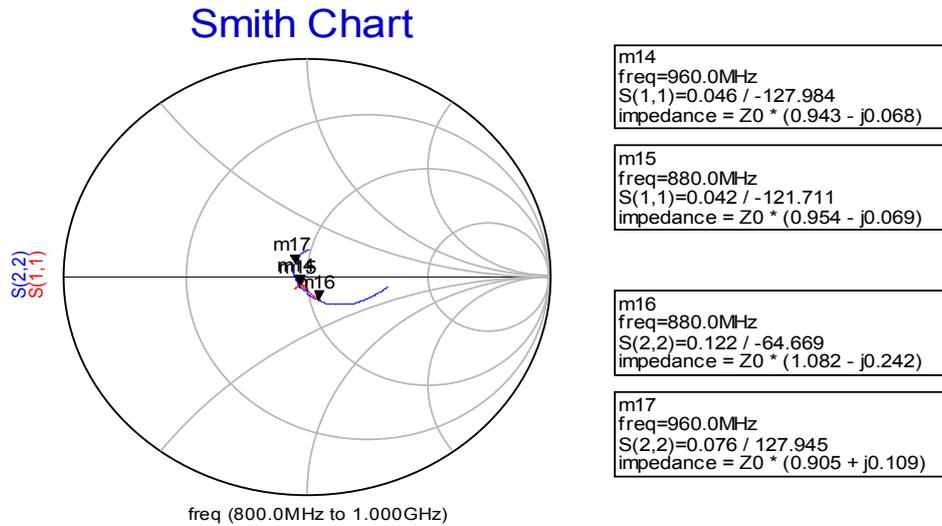
Smith Chart

m14
freq=960.0MHz
S(1,1)=0.046 / -127.984
impedance = Z0 * (0.943 - j0.068)

m15
freq=880.0MHz
S(1,1)=0.042 / -121.711
impedance = Z0 * (0.954 - j0.069)

m16
freq=880.0MHz
S(2,2)=0.122 / -64.669
impedance = Z0 * (1.082 - j0.242)

m17
freq=960.0MHz
S(2,2)=0.076 / 127.945
impedance = Z0 * (0.905 + j0.109)

freq (800.0MHz to 1.000GHz)

Fig. 9 Smith chart

Table 1: Comparison With Other Published RF Power Amplifiers.

Parameter	Ref.[5]	Ref.[6]	Ref.[7]	This Work
Frequency	1.7 GHz	2.6 GHz	2.4 GHz	0.88-0.96 GHz
Technology	GaN HEMT	GaN HEMT	RF CMOS	GaN HEMT
Stability factor	-	-	-	> 1.757
Input Return Loss (S11)	0.872 dB	~ -18 dB	-11.131 dB	-27.467at 880 MHz, -26.809 at 960 MHz
Output Return Loss (S22)	0.634 dB	~ -8 B	-12.467 dB	-18.296 at 880 MHz, -22.421 at 960 MHz
Gain (S21)	4.017 dB	~ 8 dB	43.745 dB	16.243 at 880 MHz, 15.425 at 960 MHz
Isolation (S12)	0.034 dB	-	-61.889 dB	-32.813 at 880 MHz, -32.924 at 960 MHz

5   CONCLUSION

An RF input GaN HEMT Power Amplifier for 900 MHz GSM application is designed and simulated in this paper. Microstrip transmission line is used for designing the Wilkinson Power Splitter/combiner. The input matching is realized using low pass filter networks. Two small value resistors are needed to make the circuit stable. T-shaped networks are used in output matching networks. Symmetrical design reduces the complexity of the circuit. The designed PA achieved maximum gain of 16.243 dB which is obtained at 880 MHz. Simulation results show that the matching provided by the design is proper and the circuit is unconditionally stable. Future work will provide a more thorough experimental comparison with the actually fabricated PA.

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Le Framework QMGenerator pour la qualité logicielle et la capitalisation des expériences

Youness Boukouchi[1], Adil Khamal[1], Mohammed Amine HANINE[2], Abdelaziz Marzak[1], and Hicham Motachaouik[3]

[1]Laboratoire de Traitement de l'Information et Modélisation (LTIM),
Faculté des sciences Ben M'Sik, Université Hassan II,
Casablanca, Maroc

[2]Faculté des sciences et Techniques,
Université Hassan I,
Settat, Maroc

[3]L'Ecole National des arts et Métiers,
Université Hassan II,
Casablanca, Maroc

ABSTRACT: Software quality plays a very important role in the success of software projects, it is a point of interest of all stakeholders in the software development cycle, using a variety of approaches and models to describe and measure software quality. However, these approaches and models are little far from presenting a description of the quality reliable and faithful to the needs for the users. As well as the absence of an approach allow the capitalization of the experiences accumulated during the cycle of software development. For this, the Framework QMGenerator is done to overcome these obstacles by facilitating quality modeling, and making profile reuse experiments using an extensible knowledge base that provides direction and guidance to stakeholders the software development cycle.

KEYWORDS: Model and Metamodel, knowledge base, Ontology, Quality Software

RESUME: La qualité du logiciel joue un rôle très important dans la réussite des projets logiciels, c'est un point d'intérêt de tous les intervenants dans le cycle de développement logiciel, ils utilisent une variété de démarches et modèle pour décrire et mesurer la qualité logicielle. Cependant, ces démarches et modèles sont un peu loin de présenter une description de la qualité fiable et fidèle aux besoins des utilisateurs, ainsi que l'absence d'une démarche permettant la capitalisation des expériences cumulées au cours du cycle de développement logiciel. Pour cela, le Framework QMGenerator est fait pour dépasser ces obstacles en facilitant la modélisation de la qualité, et en faisant profil de la réutilisation des expériences à l'aide d'une base de connaissance extensible permettant d'orienter et guider les intervenants dans le cycle de développement logiciel.

MOTS-CLEFS: Modèle et Métamodèle, Base de connaissance, Ontologie, Qualité logicielle.

1 INTRODUCTION

La qualité logicielle joue un rôle très important dans la réussite de développement des logiciels, c'est un point d'intersection de tous les intervenants dans le cycle de développement logiciel. Au cours de ces dernières années, plusieurs modèles et démarches ont été utilisés pour déterminer la qualité logicielle et produire des milliers des logiciels, mais

malheureusement qu'aujourd'hui, ces modèles sont un peu loin de refléter une image réelle de la qualité logicielle et de présenter une description fiable et fidèle aux besoins des utilisateurs et développeurs. En plus, cette démarche souffre de l'absence d'un processus ou outils permettant la capitalisation des expériences cumulées au cours du cycle de développement logiciel pour être partagé par la suite entre tous les membres de la communauté de l'ingénierie logicielle et d'exploiter le retour d'expériences cumulées dans les cycles de développement précédents.

Pour dépasser ces obstacles, nous avons proposé le Framework QMGenerator qui permet de gérer la qualité dans le cycle développement logiciel en se basant sur un métamodèle de qualité qui permet de modéliser et instancier les modèles sous forme d'un fichier XML pour présenter un support d'interopérabilité des concepts de qualité entre les artéfacts logiciels. Le Framework QMGenerator permet aussi la capitalisation des expériences cumulées au cours du cycle de développement des logiciels ainsi il facilitera aux utilisateurs la gestion de la qualité en tirant profils des points forts des modèles connus et des modèles éprouvés par l'expérience.

Cet article sera réparti comme suit : la section 2 introduit les modèles connus de la qualité logicielle et propose un métamodèle de qualité. La section 3 propose une ontologie de qualité logicielle développée en langage OWL. La section 4 introduit les processus et l'architecture de Framework QMGenerator. Finalement la section 5 présentes une conclusion générale.

2 LE MÉTAMODÈLE DE QUALITÉ LOGICIELLE

2.1 LES MODÈLES DE QUALITÉ LOGICIELLE

Un modèle de qualité est défini comme étant un cadre qui explique la relation entre les différentes approches de la qualité, il permet de définir et d'évaluer la qualité sous différents aspects (Produit, Processus, Ressources, etc.), dans la littérature nous avons trouvé de nombreux modèles de la qualité logicielle, la plupart d'entre eux sont de nature hiérarchique organisée sous la structure suivante: Facteurs, Critères et Métriques (FCM). L'évaluation d'un logiciel commence par la mesure des métriques de chaque critère de qualité. Ci-dessous quelques modèles de la qualité logicielle.

2.1.1 LE MODÈLE DE McCALL

Le modèle de McCall (1) combine onze critères autour de trois visions : les opérations, les révisions, et les transitions de produits. Ce modèle est reparti comme suit: Facteurs, critères et métriques.

2.1.2 LE MODÈLE DE BOEHM

Le modèle de Boehm (2) est similaire au modèle de McCall, il présente également un modèle de qualité hiérarchique structuré autour de caractéristiques de haut niveau, de niveau intermédiaire, de niveau primitif et les métriques.

2.1.3 LE MODÈLE DE DROMEY

Le modèle de Dromey (3) (4), est structuré autour d'un processus concentré sur les relations entre les attributs de qualité et les sous-attributs, ainsi que la tentative de connexion des propriétés de produits avec des attributs. L'idée principale pour créer ce nouveau modèle était d'obtenir un modèle suffisamment large pour satisfaire des différents systèmes. Les couches de ce modèle sont définies comme suit: les propriétés du produit, les attributs de la qualité, les sous-attributs et les métriques.

2.1.4 LE MODÈLE ISO 9126

Le modèle ISO9126 (5), décrit une série de caractéristiques de qualités d'un produit logiciel (caractéristiques internes et externes, caractéristiques à l'utilisation) qui peuvent être utilisées pour spécifier les exigences fonctionnelles et non fonctionnelles des clients et des utilisateurs. Chaque caractéristique est décomposée en sous-caractéristiques, et pour chacune d'elle, la norme propose une série de métriques à mettre en place pour évaluer la conformité du produit développé par rapport aux exigences formulées.

2.1.5   Le modèle GQM

GQM (Goal, Question, Metric) est une approche de la mesure des systèmes logiciels qui a été promue par Victor BASILI (6), GQM définit un modèle de mesure à trois niveaux :

- Niveau conceptuel (Goal) : ce niveau définit les buts ou les objectifs à atteindre. Un but relève de différents points de vue selon lesquels le logiciel est analysé et peut concerner les différents aspects de logiciels : le produit, le processus ou les ressources mises en œuvre.
- Niveau opérationnel (Question) : ce niveau est formé de l'ensemble des questions associées à un objectif particulier, et qui essayent de caractériser l'objet de mesure pour le qualifiée d'un point de vue particulier.
- Niveau quantitatif (Metric): ce niveau est formé de l'ensemble de données associées à une question, elles peuvent être objectives ou subjectives, elles fournissent des réponses quantitatives.

2.1.6   La modèle IEEE 1061-1998

La norme IEEE1061 (7) fournit une méthodologie pour établir des exigences de qualité ainsi que: la mise en œuvre, l'analyse et la validation des processus de mesure de la qualité produit. Cette méthode s'applique à tous les logiciels pendant les phases de cycle de vie du logiciel. Le système de qualité logiciel est conçu pour être flexible, il permet des ajouts, des suppressions et des modifications des facteurs de qualité, des sous-facteurs, et des métriques. Chaque niveau peut être étendu à plusieurs sous-niveaux. Cette méthodologie peut donc être appliquée à tous les systèmes.

2.2   Le Métamodèle de qualité logicielle

Malgré cette diversité des modèles de qualité et leur popularité dans le domaine du génie logiciel, ils ont montré quelques limites et faiblesse au niveau de définition, d'implémentation, ou d'évaluation de la qualité, à savoir :

- certains modèles présentent une difficulté à mettre en œuvre dans un environnement, vu le nombre des critères et les métriques définies, par exemple McCall présente plus de 23 critères avec une proposition de 300 métriques.
- certains modèles ne présentent pas une vision claire qui explique la correspondance entre les métriques et les critères, ainsi qu'ils ne séparent pas clairement les différents points de vue, par exemple lorsqu'un critère obtient une faible note, il est difficile de relier cette note directement au problème qu'elle pointe, surtout lorsque le critère est composé de plusieurs métriques.
- la plupart de ces modèles souffrent de l'absence de directives et de critères de décomposition des concepts de qualité complexe, ce qui rend difficile leur raffinement ainsi que leur localisation dans certains modèles de qualité de grande taille.
- ces modèles se limitent généralement à un nombre fixe de niveaux (4 niveaux maximum), ce qui limite la définition et la structuration des attributs qualité complexe en trois ou quatre niveaux, par exemple l'utilisabilité ne peut pas être décomposée vers des propriétés mesurables en seulement deux niveaux.

Alors, pour pallier ces limitations, nous avons utilisé les concepts de base de l'ingénierie dirigée par modèle (MDA, Model Driven Architecture) pour proposer un métamodèle de qualité logicielle qui permet de créer des modèles selon les exigences spécifiques des utilisateurs, ce métamodèle permet aussi de dépasser la contrainte de nombre limite des niveaux en décomposant les caractéristiques complexes en plusieurs niveaux jusqu'aux métriques. Ce métamodèle se décompose en éléments hiérarchiques, il structure la qualité en trois niveaux : vue, caractéristique, et métrique (8):

a) vue (Point de vue) : la qualité peut être perçue avec différents points de vue, les divergences des vues sont principalement dues au fait que le projet a de nombreuses parties prenantes, chaque intervenant perçoit la qualité de sa manière.
b) caractéristique : après les vues, on trouve les caractéristiques qui décrivent en détaille la perspective de la qualité pour chaque vue, (appelé Facteurs, Buts, Propriétés, etc.), ces caractéristiques sont décomposées en plusieurs sous-caractéristiques jusqu'à l'arrivée à des caractéristiques granulaires indécomposables et sont directement mesurables par des métriques.
c) métrique : c'est l'élément de base qui permet de mesurer et évaluer une caractéristique par une valeur significative.
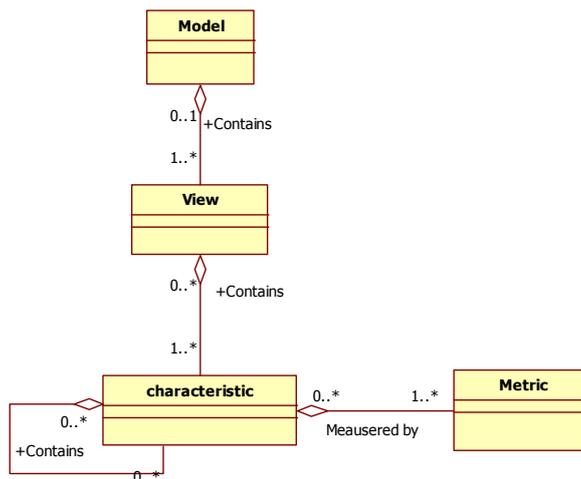
Figure 1 : Un métamodèle de qualité logicielles

Ce métamodèle de qualité (8)permet de générer des modèles de qualité tout en respectant la spécificité de chaque modèle de qualité ou de générer d'autre modèle de qualité personnels (Tableau 1). Il permet d'offrir des apports pertinents au domaine de l'ingénierie logiciel, à savoir: la définition des modèles de qualité d'une façon simple grâce à la structuration prédéfinit imposé par le métamodèle, un cadre de validation et de compréhension des modèles de qualité qui sont générés par d'autres outils de modélisations, un pont de communication entre les plateformes de développement logiciel, la simplicité de la mise-en œuvre des modèles proposés dans des environnements différents grâce à la possibilité d'instanciation des modèles en langage XMI/XML, la possibilité de décomposition à plusieurs niveaux des concepts complexe de qualité et les raffiner dans des projets de qualité de grande taille, la description fine de ce domaine de qualité facilite la description d'un domaine de connaissance à l'aide des ontologies qui complètent cette description, la possibilité d'automatisation de processus de modélisation et d'abstraction des modèles de qualité par des outils informatiques, et finalement, la possibilité de la réutilisation des modèles ou leurs éléments dans d'autre projets de qualité logicielle.

Tableau 1 : Comparaison entre la structure des modèles de qualité logiciel

Niveau	Métamodèle	McCall	Boehm	ISO9126	GQM	IEEE1061	Dromey	Modèle personnel
1	Vue	Vue	Vue	Vue	Vue	Vue	Vue	Vue
2	caractéristique	Facteur	Niveau supérieur de caractéristique	caractéristique	Objectif	Facteur	Propriétés de produit	caractéristique
3	Sous-caractéristique	Critère	Niveau Intermédiaire primitive	Sous-caractéristique	Questions	Sous-facteur	Attributs de qualité	Sous-caractéristique
4	Sous-Sous-caractéristique	-	Caractéristique primitive	Attributs de qualité	-	-	Sous-attributs	Sous-Sous-caractéristique
N	N Sous-caractéristique	-	-	-	-	-	-	N Sous-caractéristique
Base	Métrique	Métrique	Métrique	Métrique	Métrique	Métrique	Métrique	Métrique

3   L'ONTOLOGIE DES MODELES DE QUALITE

3.1   LA REPRÉSENTATION DES CONNAISSANCES

La structuration et la représentation des connaissances dans le domaine de qualité logicielle, sont les solutions idéales pour encourager la collaboration et le partage des expériences entre les artefacts logiciels et les intervenants dans le cycle de développement logiciel. Ceci exige une structuration et conceptualisation commune afin de permettre une meilleure

description des modèles de qualité, l'absence de toute notion commune de structure, de syntaxe et de sens entraîne obligatoirement l'un des problèmes d'intégration et d'interopérabilité (9).

Nous avons adopté des approches sémantiques basées sur des ontologies en particulier OWL pour permettre une description sémantique des modèles de qualité (10) (11). En se basant sur le métamodèle de qualité logicielle, nous avons déterminé les concepts de base dans le domaine de qualité logicielle (model, vue, caractéristique, métrique) ainsi que les propriétés de chaque concept et les relations liant ces concepts entre eux (12). L'ontologie développée dans ce domaine nous a permis de partager la compréhension commune de la structure des modèles entre les utilisateurs et les développeurs logiciels, de permettre la réutilisation des expériences et l'évolution des spécifications ce domaine. (13).

La figure 2 présente l'ontologie de modèles de qualité logicielle et ses concepts. Un modèle de qualité logicielle est évalué selon plusieurs points de vue, chaque point de vue définissent un ensemble de caractéristiques, ces caractéristiques peuvent être composé en plusieurs sous caractéristiques, et chaque caractéristique est mesurée par une ou plusieurs métriques, finalement, une métrique est évaluée par une valeur.
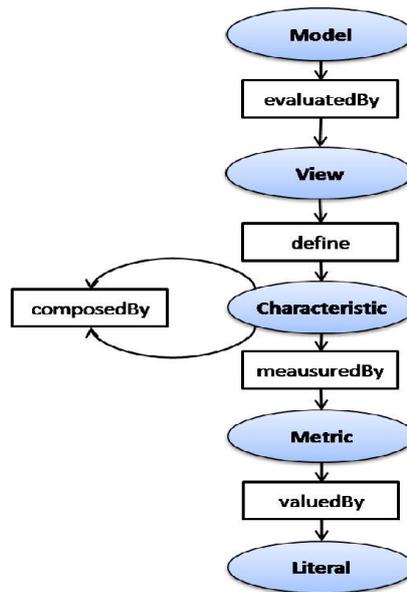

Figure 2 : Conception graphique d'ontologie de métamodèle de qualité

3.2 LA DESCRIPTION EN LANGAGE OWL

Pour décrire notre ontologie, nous avons utilisé le langage OWL qu'est un langage de représentation des connaissances construit sur le modèle de données de RDF. Il fournit les moyens pour définir des ontologies web structurées (14). Sa deuxième version est devenue une recommandation du W3C fin 2012. Ci-dessous la présentation de notre ontologie de modèle de qualité dans le langage OWL :

```
 // Object Properties
<!-- http://www.uh2m.ac.ma/QualityModel#composedBy -->
<ObjectProperty rdf:about="&QualityModel;composedBy">
        <rdf:type rdf:resource="&owl;ReflexiveProperty"/>
        <rdf:type rdf:resource="&owl;SymmetricProperty"/>
         <rdfs:range rdf:resource="&QualityModel;Characteristic"/>
        <rdfs:domain rdf:resource="&QualityModel;Characteristic"/>
</ObjectProperty>
<!-- http://www.uh2m.ac.ma/QualityModel#definedBy -->
<ObjectProperty rdf:about="&QualityModel;definedBy">
        <rdfs:range rdf:resource="&QualityModel;Characteristic"/>
        <rdfs:domain rdf:resource="&QualityModel;View"/>
</ObjectProperty>
<!-- http://www.uh2m.ac.ma/QualityModel#measuredBy -->
<ObjectProperty rdf:about="&QualityModel;measuredBy">
         <rdfs:domain rdf:resource="&QualityModel;Characteristic"/>
```

```
                <rdfs:range rdf:resource="&QualityModel;Metric"/>
        </ObjectProperty>
        <!-- http://www.uh2m.ac.ma/QualityModel#viewedBy -->
        <ObjectProperty rdf:about="&QualityModel;viewedBy">
                <rdfs:domain rdf:resource="&QualityModel;Model"/>
                <rdfs:range rdf:resource="&QualityModel;View"/>
        </ObjectProperty>
        // Data properties
        <!-- http://www.uh2m.ac.ma/QualityModel#Value -->
        <DatatypeProperty rdf:about="&QualityModel;Value">
                <rdfs:domain rdf:resource="&QualityModel;Metric"/>
                <rdfs:range rdf:resource="&xsd;string"/>
        </DatatypeProperty>
        // Classes
        <!-- http://www.uh2m.ac.ma/QualityModel#Characteristic -->
        <Class rdf:about="&QualityModel;Characteristic"/>
        <!-- http://www.uh2m.ac.ma/QualityModel#Metric -->
        <Class rdf:about="&QualityModel;Metric"/>
        <!-- http://www.uh2m.ac.ma/QualityModel#Model -->
        <Class rdf:about="&QualityModel;Model"/>
        <!-- http://www.uh2m.ac.ma/QualityModel#View -->
        <Class rdf:about="&QualityModel;View"/>
```

L'ontologie proposée pour la conceptualisation des connaissances dans le domaine de qualité logicielle, présente plusieurs avantages à savoir : elle peut être utilisée pour rechercher et repérer l'information pertinente, elle permet de gérer les connaissances et le retour d'expériences cumulées dans le processus de définition, modélisation et l'évaluation de la qualité, elle permet de favoriser le partage des expériences entre tous les intervenants dans le cycle de développement logiciel, elle permet l'interopérabilité des modèles vue que la base de description de cette ontologie sont des langage standardisés par l'OMG (comme XML, OWL), et finalement, elle permet aux systèmes multi-agents d'utiliser le retour d'expériences pour les rendre plus intelligent et performant dans l'assurance de la qualité logicielle.

Cependant, cette ontologie reste pour le moment la première version introduite dans le domaine de la qualité logicielle, nous la présentons aux chercheurs et les experts de domaine pour la discuter, la réviser, l'évaluer et la mettre en œuvre dans des applications et solutions informatiques.

4   LE FRAMEWORK QMGENERATOR

4.1   PRINCIPES DE FONCTIONNEMENT

Le QMGenerator est un Framework à base d'un métamodèle de qualité logicielle qui permet de gérer les modèles de qualité ainsi que le retour d'expérience cumulée dans le processus de définition, d'évaluation et l'amélioration de la qualité logicielle (15). QMGenerator offre un environnement permettant de faire la modélisation, l'évaluation, l'amélioration des modèles de qualité et le partage des modèles comme des expériences dans une base de connaissances. Il permet d'assurer les fonctions principales suivantes: la modélisation des modèles de qualité, le contrôle et l'évaluation de la qualité, l'amélioration de modèle de qualité, et le partage des expériences dans la base de connaissances.

Le Framework QMGenerator permet à partir de métamodèle proposé de définir des modèles de qualité logicielle tel que ISO9126 ou d'autres modèles personnels, ensuite le Framework permet d'instancier les modèles en format XML pour permettre leur utilisation par les autres intervenants dans le cycle de vie de logiciel, finalement, et finalement, Le Framework exploite le retour d'expérience pour construire une base de connaissances (Figure 3).
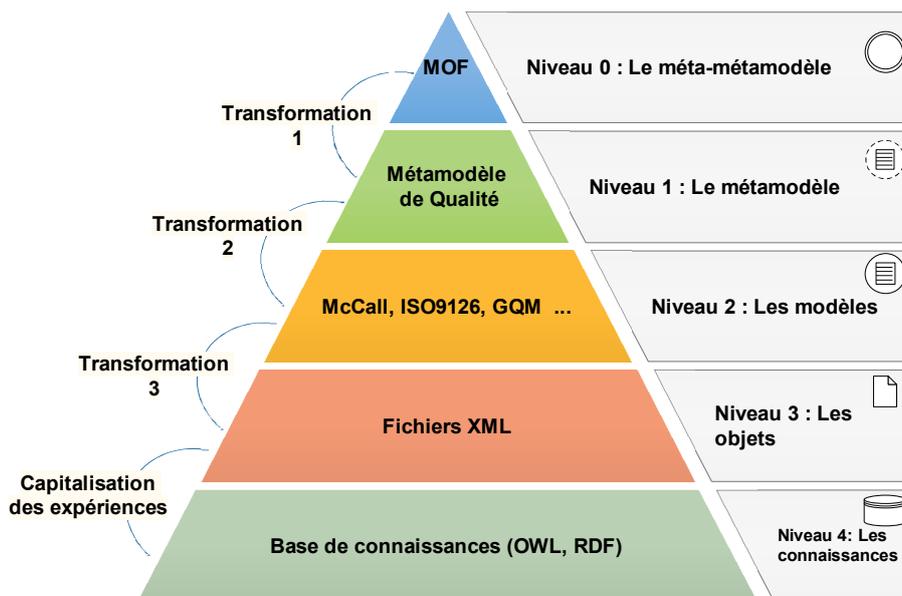
Figure 3 : Les niveaux de modélisation et de capitalisation des expériences

4.2   QMGENERATOR ET LES DÉMARCHES DE QUALITÉ

La démarche qualité logicielle est l'ensemble des actions visant l'amélioration et la gestion de la qualité logicielle, elle a pour but de faire évoluer l'organisation pour réaliser les meilleures prestations en matière de produits logiciels et services, tout en faisant intervenir l'ensemble du personnel (16). Dans la littérature nous avons trouvé un ensemble de des démarches de la qualité logicielle que nous citons ici les plus populaires et les plus utilisées dans le domaine du génie logiciel tel que la démarche PDCA et DMAIC :

- La démarche PDCA (Plan, Do, Check et Act) modélisée par Deming consiste à reproduire continuellement quatre processus, à savoir: Planifier (Plan) qui identifie les besoins et planifier la mise en œuvre des actions correctives. Réaliser (Do) qui exécute le plan d'action et mettre en œuvre toutes les opérations correctives mentionnées dans le plan. Contrôler (Check) qui vérifie les indicateurs de performance et les ressources mises en œuvre dans l'étape précédente. Agir **(Act)** qui vérifie que les solutions mises en place sont efficaces et rechercher les points d'améliorations.

- La démarche DMAIC (Define, Measure, Analyse, Improve, Control), est composée de cinq processus pour l'amélioration et l'optimisation continue de la qualité, à savoir : Définir (Define) qui définit les objectifs et les limites du projet. Mesurer (Measure) qui rassemble les informations de base sur la performance actuelle. Analyser (Analyse) qui identifie les causes originelles des problèmes de qualité. Améliorer (Improve) qui met en place des solutions s'adressant aux problèmes identifiés précédemment. Contrôler (Contrôle) qui évalue et visualiser les résultats de la phase précédente.

Le Framework QMGenerator présente un support pour ces démarches de qualité logicielle, il est composée de trois processus importants dans le cycle de l'amélioration contenue de la qualité (ACQ) logicielle, le Framework permet d'assurer la modélisation, l'évaluation, et l'amélioration contenue de la qualité, ces processus sont la base de plusieurs démarches de la qualité logicielle telle que PDCA et DMAIC (Tableau 2).

Tableau 2 : Les processus assuré par le Framework QMGenerator

Processus de qualité	Cycle PDCA				Cycle DMAIC				
	Plan	Do	Chek	Act	Define	Measure	Analyse	Improve	Controle
Framework QMGenerator	✓	-	✓	✓	✓	-	✓	✓	✓

4.3   LES TROIS PROCESSUS DE QMGENERATOR

4.3.1   LE PROCESSUS DE MODÉLISATION

La modélisation des modèles de qualité se fait en respectant notre métamodèle de qualité logicielle que nous l'avons déjà présenté, les modèles générés respectent la hiérarchie suivante : les vus, les caractéristiques (et les sous-caractéristiques) et les métriques (Figure 4), et vu l'importance des technologies XML dans le monde informatique et notamment le Web, le QMGenerator permet d'instancier les modèles de qualité dans un fichier RDF/XML.

Au cours de processus de modélisation, les utilisateurs ont le choix entre de créer leur propre modèle ou de faire l'aide de la base de connaissances pour concevoir un modèle de qualité.
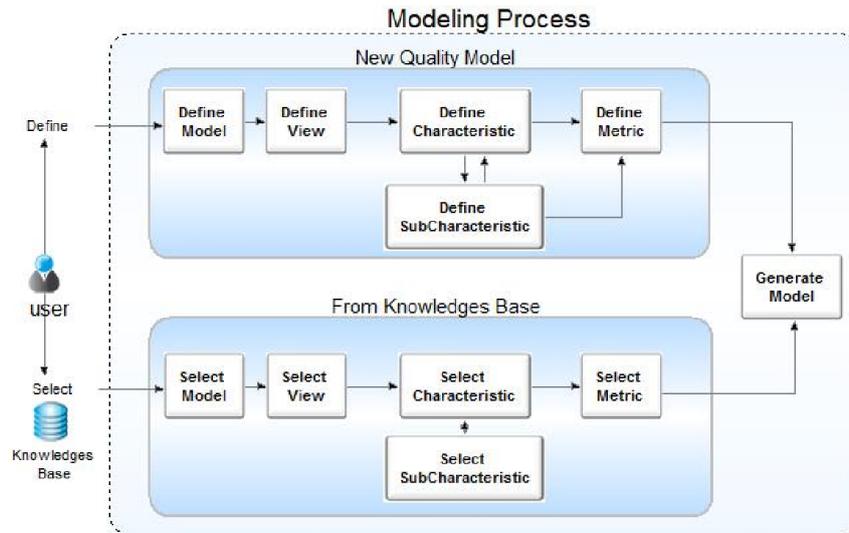

Figure 4 : Le processus de modélisation et de génération des modèles
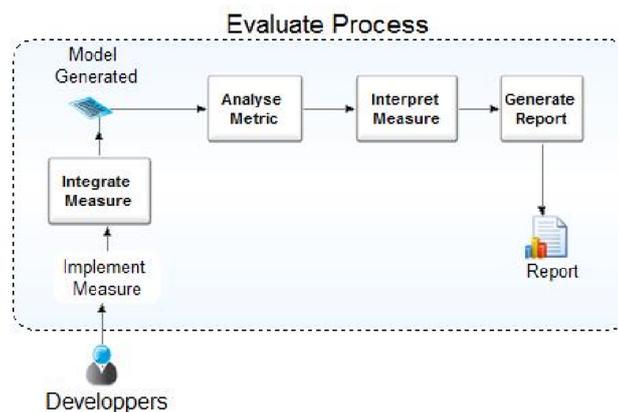
4.3.2   LE PROCESSUS D'ÉVALUATION

Figure 5 : le processus d'évaluation de la qualité logicielle

L'évaluation de la qualité se fait à travers le modèle de qualité généré, les développeurs ou les autres intervenants responsables de la qualité font la mesure des métriques, QMGenerator permet à partir de ces valeurs mesurées au cours du cycle de vie de logiciel de faire une représentation de ces caractéristiques et de générer un rapport de la qualité logiciel (Figure 5).

4.3.3 PROCESSUS D'AMÉLIORATION DES MODÈLES

Le QMGenerator permet aux responsables de la qualité de faire des améliorations pour faire des ajouts, des modifications ou des suppressions au niveau des vues, des caractéristiques ou des métriques. Une fois que ces améliorations sont faites, le modèle (ou certains éléments de ce modèle) sera une connaissance valide partageable à partir de la base de connaissances entre tous les membres de la communauté de l'ingénierie logicielle qui vont les exploiter dans des futurs projets (Figure 6).
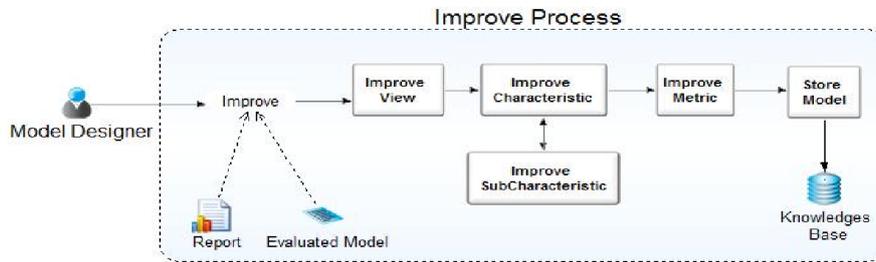

Figure 6 : Le processus d'amélioration des modèles de qualité

4.4 ARCHITECTURE TECHNIQUE

Le Framework QMGenerator est développé par le langage java, nous avons utilisé le langage OWL pour la modélisation et la représentation des connaissances, nous avons utilisé les fichiers RDF et OWL pour la sauvegarde des connaissances sous formes des triplets, et nous avons utilisé l'API comme JENA et OWL pour la gestion de ces connaissances (Figure 7).
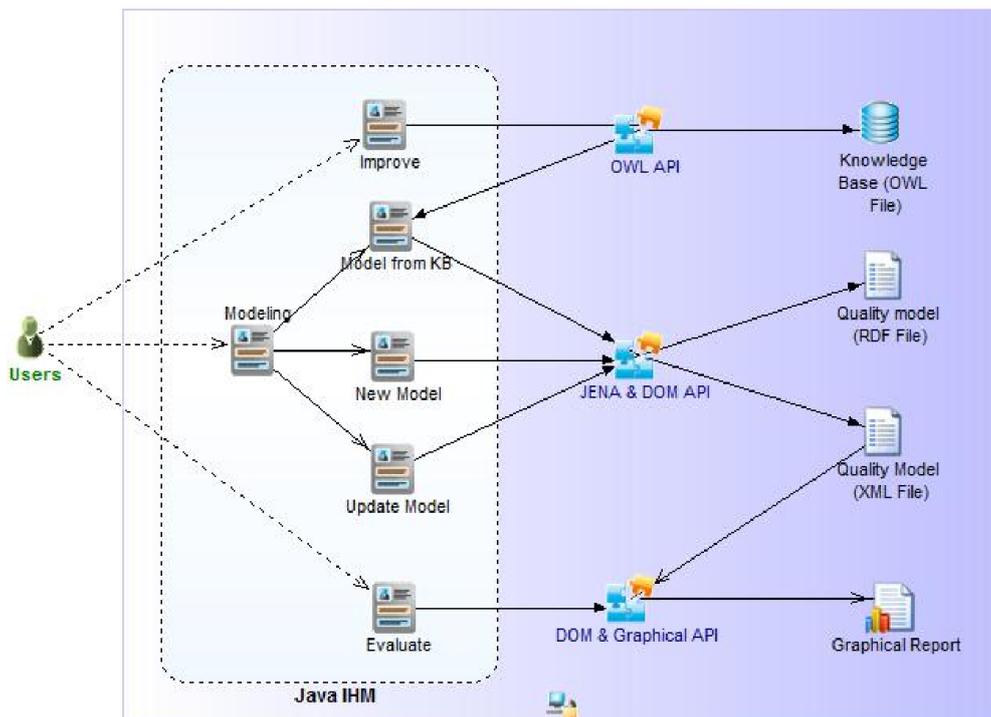
Figure 7 : L'architecture technique de Framework QMGenerator

5 CONCLUSION

Les apports de Framework QMGenerator dans le domaine de l'ingénierie logicielle et l'ingénierie des connaissances sont multiples, nous avons cité quelques applications dans cet article. Cependant il nous reste dans les futurs travaux, d'enrichir ce Framework pour offrir un support fiable aux tous les processus de démarches de qualité (PDCA et DMIAC) et les

automatiser en totalité, d'autre part, c'est exploiter parfaitement la base de connaissances pour tirer des bonnes pratiques de la qualité logicielle, et finalement est de valider le Framework dans le secteur de l'industrie.

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Predictive speculative concurrency control for Real-Time Database Systems

Elyes Kooli[1] and Nacéra Madani Aissaoui[2]

[1]High Institute of Technological Studies of Ksar-Hellal, Tunisia

[2]Faculty of Sciences Monastir (FSM), Tunisia

ABSTRACT: Real-Time Database Systems (RTDBSs) are designed to manage the majority of current applications which manipulate a large volume of data and have a great need of real-time computation. One of the main issues in the DBMSs is to control the access to the same data items by the transactions in incompatible mode. In RTDBSs, this problem becomes more complicated since the transaction manager must not only avoid data access conflicts, but it has also to provide mechanisms that help transactions to meet their deadlines, to maximize the transactions success ratio. In this paper, we describe The SCC protocol (Speculative Concurrency Control) which is one of the first concurrency control protocol RTDBS. It is based on the transactions duplicating transactions. However, the SCC raises some problems; we propose a new extension of this protocol to solve these problems and to increase the number of transactions meeting their deadline.

KEYWORDS: RTDBS, priority assignment, speculative concurrency control, predictive.

1 INTRODUCTION

Real-time applications differ from traditional applications by the time constraints they must comply and which are expressed in the form of deadlines and periods of validity. Some of these applications manipulate large amounts of data. Using Systems Management Database (DBMS) may be necessary to handle such data effectively.

However, the traditional DBMS do not effectively meet the needs of these applications because they do not incorporate mechanisms to take into account the time constraints [13]. This imposed new challenges for computer scientists. It is developing a new generation of DBSs: the Real-Time database system RTDBS.

A real time database system is a database system which uses real-time processing that attempts to satisfy the timing constraints associated with each incoming transaction.

Typically, a time constraint is expressed in the form of a deadline handle. This differs from traditional databases containing persistent data, mostly unaffected by time RTDBS are systems that must meet a dual objective: to maintain the consistency of the database and have mechanisms that allow transactions to meet their time constraints, often given in the form of deadlines.

To maintain consistency of the currency database, the transaction manager must prevent data access from the conflict problem. A conflict occurs when two transactions not yet validated want to access on the same data with incompatible operation mode (read-write, for example). In a Database Management System (DBMS), *Database* concurrency *conflicts* are resolved by the concurrency control protocols [2]. These protocols can be classified into two families.

The first method, called pessimistic which uses locking as the basic serialization mechanism to prevent potential conflicts: reading or writing is validated before access to the data. Instead, the second, called optimistic, based on the idea of conflicts and transaction restart [12], allow transactions to run in competition and conflict are only checked in validation phase where conflicted transactions are abandoned and restarted.

For Real-Time DBMS (RTDBS), the problem is more complicated: the RTDBS must respect not only the integrity constraints of the database but also the individual time constraints of transactions that are expressed by assigning a deadline each transaction. Transactions are correct if they are validated before theirs deadlines [13].

The performance of a RTDBS is mainly determined by a concurrency control algorithm used for scheduling concurrent accesses of transactions to hardware and logical system resources. The scheduling of transactions is based on priority order. Given these challenges, considerable research has recently been devoted to designing concurrency control algorithms for RTDBS and to evaluating their performance [1]

This paper, we investigate a control protocol real-time competition designed specifically for RTDBS: SCC Protocol (Speculative Concurrency Control) proposed by Bestavros [3]. This protocol combines both advantages of pessimistic and optimistic concurrency control (PCC and OCC) methods because it detects conflicts as they arise (pessimistic) method but it allows transactions to run in competition (optimistic) method. SCC protocol is particularly suitable for RTDBS in the sense that it reduces the negative impact of blocking and restarting which are the main drawbacks of pessimistic and optimistic methods respectively [3]. Thus we propose significant improvements to this method.

2   THE SPECULATIVE CONCURRENCY CONTROL PROTOCOL SCC

A.   NOTATION

The major notations and symbols used in this paper are as follows:

T_i transactions running in competition
T_i' Each transaction can be duplicated and shadow transaction Ti
S: Start transactions
R_x: Operation to Read x data item
W_x: Operation to Write and update x data item
x_0: Value of x data item before updating by write operation
x_1: Value of x data item after updating by write operation
C: commit
A: aborted

In the remainder of this paper, we denote Ti transactions running in competition. Each transaction can be duplicated and phantom transaction Ti is denoted Ti. The operations performed by transactions are S (Start) to start, Rx (Read x) and Wx (Write x) to read and update the data x. C and A are used when the transaction is committed or aborted.
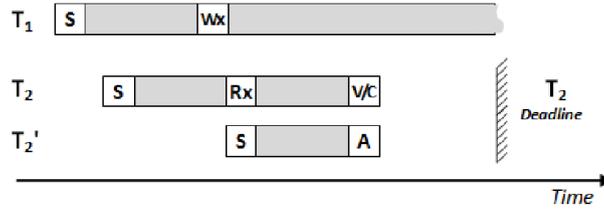
B.   PRINCIPE

The Speculative Concurrency Control protocol (SCC) has been proposed to solve the problems of conflict type Read-Write or Writing- Reading [3] . At the time when a conflict of this type is detected (using locking data, for example), SCC protocol suggested to duplicate the read transaction. The new copy of the transaction is called "shadow transaction".

The original reader transaction continues to run optimistically whereas the shadow transaction remains blocked at the point of conflict. The original transaction and the shadow transaction are almost identical; they differ only in the data they handle. The original transaction runs with the image data before updating that by the writer transaction. However, shadow transaction is blocked with image data after updating by shadow transaction, updating the writer transaction will actually be taken into account. In this way, the shadow transaction may has been committed if the original transaction will be aborted to resolve the conflict.

To better illustrate this method, consider the following example. Assume that we have two transactions T_1 and T_2. T_2 reads item x after T_1 has updated it. We will have two possible scenarios shown in Fig. 1 and Fig. 2 depending on the time needed for transaction T2 to reach its validation phase. Each one of these scenarios corresponds to a different serialization order

- Case 1. If the reader transaction T2 reaches its validation phase before the writer transaction (T_1), then the shadow transaction (T2') is simply ignored and has to be aborted as shown in Figure 4.1 (a).

- Case 2. If the writer transaction (T_1) reaches its validation phase before T_2, then T_2 cannot continue to execute because it has accessed to incoherent item x. T_2 is aborted. The shadow transaction (T_2') is released and it runs taking the updating value of x item by T_1 (Figure 4.1 (b)). Thus, T_2 is not restarted from the beginning but simply from the point of conflict.

(a) Schedule with a developed potential conflict
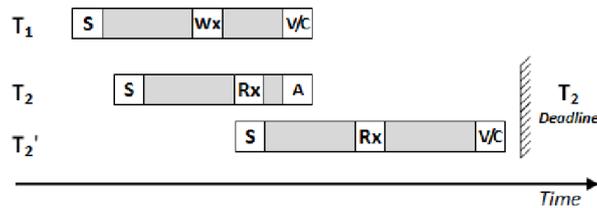
(b) Schedule with a developed conflict

Fig. 1.   *Principe of SCC protocol*

When the shadow transaction is released, it becomes a main transaction and may it be duplicated if a new conflict arises. In RTDBBS, many transactions can be executed in competition. SCC basic protocol creates a shadow transaction every appearance of a new conflict. Management of all transactions ghosts is not easy even if at a given time, only one copy of the transaction is actually executed, the others being stranded at their respective points of conflict. A class of protocols has been proposed to limit the number of copies of each transaction. This class is called SCC- kS (k-Shadow SCC) where each transaction can have at most k copies. Among this class of protocols, the most studied is the protocol SCC- 2S (Two Shadow SCC) which authorizes the creation of a single shadow transaction by primary transaction.

C.   CONVENIENCE OF THE SPECULATIVE METHOD IN A REAL TIME CONTEXT

The main advantage of the protocol SCC is that it combines the advantages of pessimistic and optimistic methods while avoiding their main drawbacks

On the one hand, SCC resembles PCC in that potentially harmful conflicts are detected as early as possible, allowing a head-start for alternative schedules, and thus increasing the chances of meeting the set timing constraints, should these alternative schedules be needed (due to restart as in OCC). On the other hand, SCC resembles OCC in that it allows conflicting transactions to proceed concurrently, thus avoiding unnecessary delays (due to blocking as in PCC) that may jeopardize their timely commitment [3].

D.   WRITE-WRITE CONFLICTS RESOLVING

At first, SCC protocol does not take into account the conflicts between transactions looking to update the same object data together (Write-Write conflict). It was then proposed to use the TWR method (Thomas Write Rule) to treat these conflicts [5].

TWR method is based on the timestamps of transactions using the following hypothesis: "Only the write operation of the transaction largest stamp (the youngest transaction) will be visible at the end of the execution of all transactions» [2]. TWR method is based on the timestamps of transactions using the following hypothesis: "Only the write operation of the transaction largest stamp (the youngest transaction) will be visible at the end of the execution of all transactions» [2]. Thus, the write operation of a transaction can be ignored if another younger transaction has already updated the some data. With this assumption, when a transaction T_1 wants to write about a given transaction while a younger T_2 has already written on this data, the writing of T_1 is simply aborted.

E.   VALUE-COGNIZANT SCC

Speculative method seems interesting in a real time environment even if, the time constraints of transactions are overlooked on processing conflicts. A problem with SCC algorithms and other common concurrency control schemes is that

committing a transaction as soon as it finishes validating, may result in a value loss to the system. Another extension of the SCC protocol has been proposed to reflect the transactions deadlines and their criticality.

The value-cognizant SCC protocol uses deadline and criticalness information in resolving data conflicts or in making other scheduling decisions. In fact, these parameters are used to calculate a coefficient of penalty (penalty gradient) for each transaction. When a transaction finish, the penalty coefficient determines if the commit operation cannot be deferred to solve the conflict.

For example, in figure 2, committing T_1 as soon as it is validated causes T_2 to miss its deadline and a value penalty to be assessed to the system. Haritsa showed that by making a lower priority transaction wait after it is validated, the number of transactions meeting their deadlines is increased, which results in a higher value-added to the system [7].

Consider Figure 1 (b). If the deadline of T_1 is sufficiently far, it may defer its committing operation and allow time for T_2 to complete. One then obtains the situation shown in Figure 2: as the commit operation was delayed T_1, T_2 can finish and the conflict is resolved.
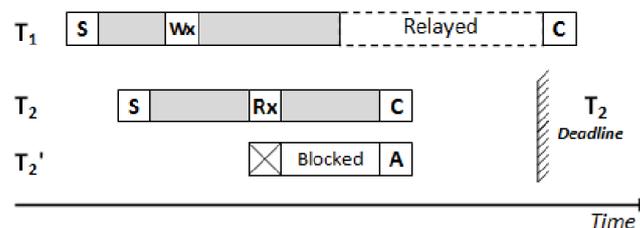

Fig. 2. A deferred commit under the Value-cognizant SCC

3 THE LIMITS OF SPECULATIVE CONCURRENCY CONTROL PROTOCOL SCC

SCC protocol has some interesting mechanisms for the management of real-time transactions. Unfortunately, despite the improvements that have been proposed, problems persist in its use. We will, in this section, illustrate the limits of the SCC protocol. Then, in the next section, we propose methods to overcome these problems.

First, consider the conflicts W-W category. They are solved by the TWR method that uses timestamps for transactions possibly ignore write operations. In a real-time context, this method is impractical. Indeed, the use of stamps is not adequate in RTDBS since it ignores the temporal constraints of the transactions. In addition, the fact that only the results of the youngest transaction are visible at the end of the execution is not applicable in a real time environment. Indeed, the results of a transaction in a RTDBS are important (reusable by other transactions) as soon as it has validated [13]. TWR method suffers from the problem of losing update that can be detrimental in a RTDBS.

There are also some problems in resolving Read-Write and Write-Read conflicts some problems. More precisely, we believe that the performance of SCC Memorandum is limited to the management of real-time transactions. For example, Figure 4.4 illustrates a situation where only one of the two transactions can meet its deadline. Indeed, the commit operation of T_1 cannot be deferred and when T_2 is released, it does not have enough time to run. If the deadlines of transactions are soft type only the QoS T_2 will decrease. However, if the transactions are strict deadlines, T_2 provides no income and therefore reduces performance RTDBS [10].
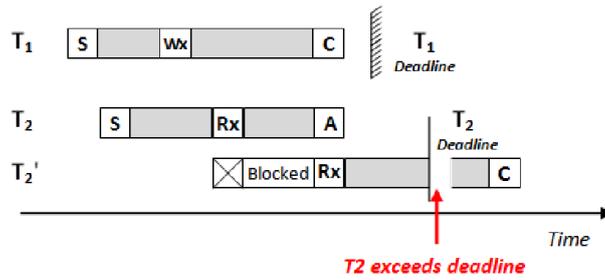
Fig. 3. Example of limitation of SCC protocol

4 PREDICTIVE SPECULATIVE CONCURRENCY CONTROL PSCC

In this section we introduce a new variant of SCC method called Predictive Speculative Concurrency Control PSCC. Our goal is *to minimize the number of transactions* that miss their *deadlines.*

A. READ-WRITE AND WRITE-READ CONFLICTS RESOLVING

At first, we proposed PSCC protocol to increase performance by optimizing protocol SCC conflict resolution type R-W and W-R; indeed we integrate a policy for scheduling transactions at the time of detection conflicts. In other words, unlike the speculative methods presented, we propose to consider transaction parameters upon detection of a conflict.

In fact, it is to choose, at the time of duplication, it is preferable that the originally transaction continues running with the image in front of the given conflict without considering the changes made by the transaction to writing in conflict, or with the image data after the conflict i.e. taking into account the modification of data provided by the writer transaction. This problem of decidability depends on two factors:

- In addition to scheduling two conflicting transactions, we should predict who will finish the first, the write transaction T_1 or the read transaction $T_{2?}$ If the write transaction T_1 complete its first run, it would be preferable that the read transaction T_2 chooses the new values x1 updated by T_1. In the opposite case where the read transaction T_2 complement its first run it would be interesting that T_2 have used x0 value.

- On the one hand, the fate of the write transaction: is it can succeed scripts without missing the deadline? Indeed, if the write transaction T_1 has a great chance to validate then it is advantageous that the read transaction T_2 chooses new value x1. Conversely, if the write transaction T_1 has a low chance to validate scripts then it is better than read transaction T_2 selects the old value x0.

To resolve this decidability problem, we propose in the following sections two ways to manage the two factors in question.

B. ALLOCATION OF LUCKY POLICY

We use the following policy to calculate the hope that a transaction can do its job without exceeding its deadline. The idea is based on a metric that estimates the opportunities to success for each transaction in conflict with other transactions. The formula 1 presents the priority assignment policy.

$$Hope(T_i) \leftarrow \overbrace{\frac{[D(T_i) - T_A(T_i)] - E_{est}(T_i)}{\underbrace{[D(T_i) - T_A(T_i)]}_{B}}}^{A} * \underbrace{\frac{P(T_i)}{P_{\max}}}_{C}$$

Formula 1

D(Tᵢ) : T_i Deadline
Tₐ(Tᵢ) : T_i arrived time
Eₑₛₜ(Tᵢ) : estimated execution time of the transaction T_i

$P(T_i)$: Priority T_i

P_{max} : highest priority assignment for transactions

Part A of the formula is slack time. The slack time is simply the difference between the time available and the execution time [1]. Part B expresses the time available, the available time is the time between the start time (time arrived) and expiration date. Finally Part C is a weighting that reflects the degree of resistance of the transaction conflicts with other transactions.

C. PRECEDENCE TERMINATION ORDER OF TRANSACTIONS

It is to know the order of termination of the two conflicting transactions. Just compare the remaining executions time of transactions. Indeed, when a conflict is detected, we compare the remaining execution time E_{rt} of transactions conflict.

So if $E_{rt}(T_1)<E_{rt}(T_2)$ then it is possible that T_1 complete before T_2 otherwise the termination of T_2 before T_1 is more feasible .

However, the second factor depends on the first, since you cannot properly determine termination of both transactions unsuspecting fate of the write transaction is that it could validate scripts or not.

This led us to determine a new metric called the coefficient precedence K, this metric provides information about the order of precedence of conflicting transactions which facilitates good decision making (the read transaction T_2 must use the image before or after the data at issue) , this coefficient is represented by the following formula :

$$K(T_{i/j}) \leftarrow \frac{[D(T_i) - T_A(T_i)] - E_{est}(T_i)}{[D(T_i) - T_A(T_i)]} * \frac{P(T_i)}{P_{max}} * \frac{E_{rt}(T_j)}{E_{rt}(T_i)}$$

Transaction T_j in conflict with the transaction T_i Thus, if K $(T_{1/2})$ and K $(T_{2/1})$ are the respective coefficients of T1 and T_2, then the duplication of T_2 is managed as follows :

- If K $(T_{1/2})$ < K $(T_{2/1})$, then we can assume that T_2 has a good chance to finish before T_1 (here T_1 ends before T_2, we can apply the protocol value- cognizant SCC to defer termination T_1). A write operation T_1 does not impact on the course of T_2. Optimistically, T_2 runs using the back image x0 of x conflict data while the shadow transaction T_2' is stuck with the front image x1 of x given conflict.
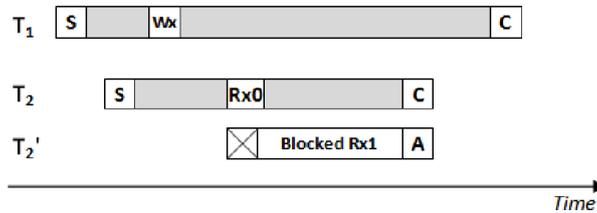
Fig. 4. T1 above T_2: T_2 uses the image before x

- If K$(T_{1/2})$ > K$(T_{2/1})$, then for the same reasons as the previous case , T_1 has a good chance to finish before T_2 and any amendments will be considered by T_2. Running the SCC protocol may lead to the situation in Figure 4.4. Therefore, transaction T_2 must run after the image of x1 given x, so the ghost transaction T_2' is blocked with x0 before the given x. (Figure 4.6) we see that this time , the two transactions T_1 and T_2 can meet their deadlines
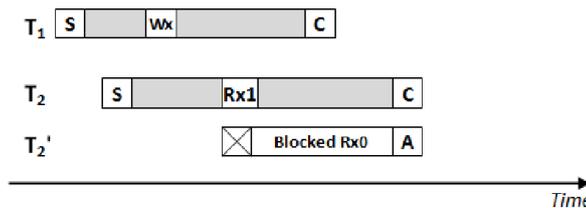
Fig. 5. T_1 precedes T_2: T_2 uses the after image of x

The PSCC protocol allows more transactions to complete before maturity by choosing a smart way the image taken by the main transaction and that the ghost transaction scheduling transactions between reading and writing based on temporal parameters of conflicting transactions. It is important to note that using the assumption that a transaction can access data not yet validated, the PSCC protocol relaxes the property transaction isolation.

D. RESOLUTION OF W-W CONFLICTS

The PSCC protocol also supports conflict resolution W-W type without the use of stamps proposed by the TWR method or duplication of transactions that overload the system benefit transactions.

We adopt the basic SCC protocol for conflict resolution R-W/W-R where you create a ghost transaction for the read transaction at issue, to the point of conflict is a ghost proliferate transaction for one of the two write transactions in conflict.

We propose to use the same predictive method we proposed for the management of type conflicts R-W and W-R for the choice of the write transaction to give him a ghost transaction. Indeed the transaction that most likely validate scripts and ended the first will be a new ghost transaction. The management of the main transaction and the shadow transaction is then identical to that of SCC protocol.

Indeed, if $K (T_{1/2}) < K (T_{2/1})$ then we can anticipate that T_2 has a good chance to finish before T_1, in which case it creates a shadow T_2'au point of conflict transaction which stores the point of conflict . The originally transaction T_2 is running with the front image of the data, that is to say that the update of the transaction T_1 is not counted. As against the T_2' remains blocked with the image data after this phantom transaction, that is to say, if the transaction is enabled phantom, the update of the transaction T_1 will be effectively taken into account . In this way, the ghost transaction may be released if the main transaction will be abandoned to resolve the conflict.

Figure 4.7 illustrates the two possible situations of conflict WW: when T_1 precedes T_2 (FIG. 5 (a)) and when T_2 precedes T_1 (FIG. 5 (b)).
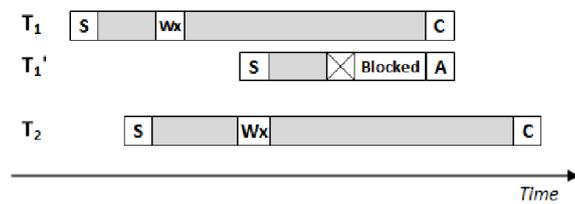
(a) T_1 precedes T_2
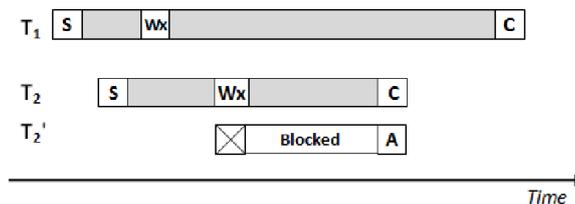
(b) T_2 precedes T_1

Fig. 6.   Principe of PSCC protocol W-W mode

The algorithm PSCC protocol defined above is as follows:

Algorithm: PSCC

<u>*Start*</u>:

<u>*Detection of a conflict: (Write (Ti, x), read (Tj, x))*</u>

1)   *If K (Ti) <K (Tj) then*
2)   *Run (Ti)*
3)   *Tj ' ← duplicate (Tj, x1)*
4)   *Block (Tj ')*
5)   *Run (Tj, x0)*
6)   *If Tj ends before then Ti*
7)   *Ignore (Tj ')*
8)   *otherwise*
9)   *Ignore (Tj)*
10)   *Unlock (Tj ')*
11)   *end if*
12) *else*
13)   *Run (Ti)*
14)   *Tj '← Duplicate (Tj, x0)*
15)   *Block (Tj ')*
16)   *Run (Tj, x1)*
17)   *If Tj ends after Ti then*
18)   *Ignore (Tj ')*
19)   *else*
20)   *Ignore (Tj)*
21)   *Unlock (Tj ')*
22)   *end if*
23) *end if*

<u>*Conflict detection: (Write (Ti, x) and Write (Tj, x))*</u>

1)   *x0: initial value of x*
2)   *x1: Writing Ti*
3)   *If K (Ti) <K (Tj) then*
4)   *Run (Ti)*
5)   *Tj '← duplicate (Tj, x1)*
6)   *Block (Tj ')*
7)   *Run (Tj, x0)*
8)   *If (Tj ends before Ti) then*
9)   *Ignore (Tj ')*
10)   *else*
11)   *Ignore (Tj)*
12)   *Unlock (Tj ')*
13)   *end if*
14) *else*
15)   *Run (Tj)*
16)   *Ti '← Duplicate (Ti, x1)*
17)   *Block (Ti ')*
18)   *Run (Ti, x0)*
19)   *If Ti completes before Tj then*
20)   *Ignore (Ti ')*
21)   *else*
22)   *Ignore (Ti)*
23)   *Unlock (Ti ')*
24)   *end if*
25) *end if*

<u>*End.*</u>

5 PERFORMANCE EVALUATION

To evaluate the performance of PSCC method, we have developed a RTDBS Simulator of firm deadline transactions (transactions which miss their deadlines are immediately killed). The simulation model, workload parameters, and assumptions are similar to those in [4,7] to make the results compatible

A. SIMULATION MODEL

We assume a closed queuing model of a single site database system, which consists of multiple CPUs sharing the common memory and a memory-resident database. The transaction arrival rate follows a Poisson distribution and each transaction is associated with an arrival time, a deadline, and an estimated execution time.

A transaction will request a sequence of read and write operations. The scheduler uses the underlying priority assignment policy to selected the transaction with the highest priority in the ready queue for execution.

B. WORKLOAD MODEL

The workload model characterizes the transactions running in the system according to the number of pages they access and their execution time. Table 1 summarizes the key workload parameters used in our experiments.

Table I lists the workload model parameters used and their base values. The deadline of a transaction T_i is assigned as $D(T_i) = T_A(T_i) + SRatio * R_{max}$ where R_{max}, is the required resource time for the largest transaction in the workload.

Table 1. The Workload Parameters

Parameter	Meaning	Settings
DBSize	Database size in pages	1000 pages
TRANSize	Size of transactions in pages accessed	20 pages
WProb	Probability to update an accessed page	0.25
RSize(Ti)	Number of readied pages by transaction Ti reads	Randomly
WSize(Ti)	Number of written pages by transaction Ti reads	Randomly
SRatio	Slack Ratio	1.5
RTime	Average time to read a page	3 msec
WTime	Average time to update part of a page	15 msec

Performance metric used in this paper is the number of transactions that miss their deadlines, Missed Deadlines.

*MissRatio = (number of transactions missing the deadlines) / (total number of submitted transactions) * 100%*

C. EXPERIMENTAL RESULTS

FIG. 6 show the average number of transactions missing their deadlines. The both methods have the same performance for a small number of transactions in the system. But, when the multiprogramming level in the system increases, the superiority of the PSCC appears.
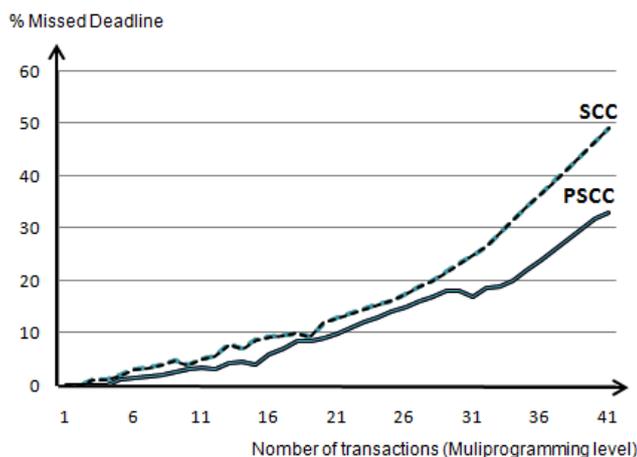
Fig. 7.   SCC vs. PSCC Baseline Model (Missed Deadline)

Even though both speculative methods manage to preserve a large portion of the computation performed by each individual transaction, the reason that PSCC outperforms SCC can be explained by the fact that PSCC predicts and select for the transaction on conflict, the data value (before or after update) to avoid restarting.

This property of PSCC is especially advantageous when the number of data conflicts in the system increase.

6   CONCLUSION AND PERSPECTIVES

The SCC algorithm is interesting in the sense that it has the advantages of both pessimistic and optimistic methods of concurrency control methods for transactions. However, further study shows that disadvantages remain in its development. SCC protocol, for example, does not take into account the time constraints of transactions. We have therefore contributed to the evolution of the SCC method to reduce these drawbacks and allow more transactions to meet their deadlines.

We plan to extend this work in several ways. We will exploit semantics data for scheduling transactions. Further, we also plan to extend our work to manage multisite real time databases.

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Effects of Postharvest Losses on Selected Fruits and Vegetables Among Small-scale Farmers in Gboko Local Government Area of Benue State, Nigeria

P.G. Kughur, G.M. Iornenge, and B.E. Ityonongu

Agricultural Extension & Communication Department,
University of Agriculture, Makurdi, Benue State, Nigeria

ABSTRACT: The study examined the effects of postharvest losses on selected fruits and vegetables among small-scale farmers in Gboko Local Government Area of Benue State. Purposive sampling was adopted in selecting four different local fruits and vegetable markets, in each of the markets selected 30 respondents (fruits and vegetables producers) were selected randomly, making a total of 120 respondents. Structured questionnaire was administered on the respondents through interview. Data collected were analyzed through descriptive statistics and multiple regression. Results of the findings revealed that 55% of the producers were female, 38.2% were age between 21-30 years, 85.8% had family size of between 1-5 persons, 36.7% attended tertiary institutions, 62% were farmers and 56.7% had farming experience of between 1-9 years. The results further revealed that 48.5% lost about $30.5 on annual basis, 35% lost at least 1,000Kg of fruits and vegetables on annual basis, 57.5% lost produce due to non-availability of buyers, 55% of the produce were tomatoes, there was a significant difference between effects of postharvest losses and socio-economic characteristics of the respondents at ($P<1$). It is recommended that government should provide infrastructure for fruits and vegetables processing industries to be established in the area to avoid fruits and vegetables wastages.

KEYWORDS: postharvest, losses, fruits, vegetables, farmers.

INTRODUCTION

In Agriculture, post harvest handling is the stage of crop production immediately following harvest. It includes storage, cleaning, packing, transportation and sorting [1]. The most important goals of postharvest handling are to keep the produce cool, thereby avoiding moisture loss and slowing down undesirable chemical changes and to avoid physical damage such as bruising to delay spoilage. This in turn will help ensure increased food security as food security goes beyond food production to include distribution and marketing, adequate and stable supply, and accessibility to food. Usually, losses occur from poor storage conditions in the markets and poor packaging during transportation. Due to the physiological form of fruits and vegetables, they deteriorate easily in transit and storage, especially under conditions of high temperature and humidity and as a result, heavy losses occur in these crops [2]. Physiological form of fruits and vegetable encourages increased pace of metabolic activities, which is quickened by higher temperatures prevalent in tropical countries. Respiration brings about loss of considerable quantity of the main nutritional ingredient-ascorbic acid in vegetables. Losses of fruits and vegetables also occur in transit due to long distance to markets, poor and inadequate infrastructure, and the method of transportation [3].

According to [4], in developing countries postharvest losses of fruits and vegetables are more serious than those in developed countries. In most developing countries the number of scientists concerned with postharvest handling research is significantly lower than those involved in production research. The handling procedures used in technologically advanced countries to reduce post harvest losses are not fully recognised in developing countries. [4] further suggests that in developing countries, for perishable crops like fruits and vegetables, storage, packaging, transporting and handling technologies are practically non-existent, hence considerable amount of produce are lost. [5] outlines the multiple effects of post harvest loss as going beyond the loss of the actual crop to include loss in the environment, resources, labour needed to

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produce the crop and livelihood of the individuals involved in the production process. Post harvest loss tends to prevent adequate supply of and accessibility to fresh agricultural produce, thereby causing an increase in the price of such produce at certain period in the year and leading to a glut at another time.

In Nigeria post harvest losses of fruits and vegetables amounts to 35-45% of the annual production [6]. This is because in Nigeria, generally handling procedures are not fully recognized and understood. Understanding factors that contribute to post harvest losses of fruits and vegetables is very critical, these factors include environmental conditions such as heat, drought, mechanical damage during harvesting and handling, improper post harvest sanitation, unsuitable packaging materials, poor cooling and storage practices [7]. To achieve self sufficiency in food, there is an urgent need to match all efforts at increasing crop production with equal if not greater efforts of post harvest technology to save the crops that are produced from deterioration and wastages [8; 9; 10].

It is distressing to note that much is being devoted to planting crop, so many resources are spent on irrigation, fertilizer application and crop protection measures only to be wasted in few days after harvest. Fresh horticultural produce is highly perishable with some estimates suggesting a postharvest loss of 30 to 50% in fruits and vegetables. The loss occurs due to poor pre-production and post-harvest management as well as lack of appropriate processing and marketing facilities. These losses have several adverse impacts on the farmer income, consumer prices and nutritional quality of the produce. Nigeria with a population of over 150 million people is considered an agrarian nation because over 80% of her population engages in agricultural activities. However, about 90% of Nigerian farmers engage in subsistence agriculture without adequate capital to expand their farms and store their farm produce after harvest so that agro-processing facilities could access them all year round. Due to the dearth of infrastructural facilities such as good roads, processing and storage equipments as well as inadequate marketing information, huge quantities of these agro raw materials waste uncontrollably.

Absence of farm storage facility and proper pack house/packing station results in the perishable produce being marketed immediately after harvesting without primary processing and adequate packaging [11]. The solid wastes originating from horticultural crops in the rural areas can create drainage problems, as well as invite stray animals near garbage dumps. These bio-wastes also deteriorate very rapidly causing unhygienic conditions, increasing atmospheric pollution and provide a breeding ground for pests. The loss of food in the post-harvest system is not new; it has always been a problem for mankind. In these days of rapidly enlarging population in the poorest countries of the world where food is already short, there is an increasing urgency to do a better job of conserving food supply in order to alleviate hunger and malnutrition [12]. Efforts to reduce post harvest losses of high perishable produce such as fruits and vegetables in developing countries are considered crucial not only to avoid wastage but also to reduce the cost of preventing food losses [13]. Fruits and vegetables preservation is considered to be the less costly option compared to producing a similar additional amount of food of the same quality. Hence, cutting the cost of post harvest losses will reduce prices for the consumers and increase the farmers' income [13].

Appropriate post harvest handling practices are important to minimize post harvest losses and to maintain the quality of fruits and vegetables. Potential post harvest handling activities include packaging, pre-treatment, pre-cooling, washing with water and sorting [11]. The function of packaging is to protect the produce from mechanical injury and contamination during marketing. It also prevents moisture loss, and facilitates in chemical treatment and ethylene absorption [14]. Pre-treatment of fruits are mostly carried out to protect the produce from decay causing factors such as microorganisms [11]. Rapid pre-cooling of commodities with short post harvest shelf life will maintain the produce in a condition acceptable to the consumer because rapid lowering of temperature could help slow down the rate of metabolism and therefore extend the shelf life of the produce [15]. Usually, cleaning and washing are the only preservation treatments applied to minimally process fresh fruits and vegetables. Cleaning could also involve removal of foreign materials like twigs, stalks, dirt, sand, soil, insects, pesticides and fertiliser residues from fruits and vegetables, as well as from containers and equipment [16]. In addition, sorting is carried out to discard decayed or injured produce and therefore to limit the spread of infection to other units, especially if no post harvest pesticides are used [17].

METHODOLOGY

Gboko is one of the 23 Local Government Areas (LGAs) in Benue State, It is located between longitude 8° and 9° East and latitude 7° and 9° North with a land mass of about 4,000 square kilometres and a population of about 358,936 people [18]. The LGA is largely inhabited by Tiv (one of the local tribes in the study area) people who are predominantly farmers. They produce a variety of crops like yam, groundnut, soybeans, maize, rice, sorghum, tomatoes, pepper, garden eggs, okra, citrus, mangoes, cashew, and pears among others. Gboko LGA experiences tropical climate with dry and rainy seasons. Purposive sampling was adopted in selecting four different local fruits and vegetable markets, in each of the markets selected 30

respondents (fruits and vegetables producers) were selected randomly, making a total of 120 respondents. Structured questionnaire was administered on the respondents through interview. Data collected were analyzed through descriptive statistics and multiple regression.

The formula for multiple regression model is given by:

$$Y = A + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 \text{ --------------------- (1)}$$

Where

Y = post-harvest loss experienced by farmers in kg (dependent variable)
A = constant
B_1, B_2, B_3, B_4 and B_5 = coefficients of the variables
X_1 = Age
X_2 = level of education
X_3 = years of farming experience
X_4 = annual income
X_5 = family size

RESULTS AND DISCUSSION

Table 1: Selected Socio-economic Characteristics of the Respondents

Variables	Frequency	Percentage
Sex		
Female	66	55.0
Male	54	45.0
Age (years)		
21-30	46	38.2
31-40	36	30.0
41-50	19	15.9
51 and above	19	15.9
Family size		
1-5	103	85.8
6-10	13	10.8
11 and above	4	3.4
Educational status		
Tertiary education	44	36.7
Secondary education	38	31.7
Primary education	21	17.5
No formal education	17	14.1
Major occupation		
Farming	73	62.0
Civil service	17	14.1
Others	16	12.3
Artisan	13	10.8
Fishing	1	0.8
Farming experience (Years)		
1-9	68	56.7
10-19	33	27.5
20-29	14	11.7
30 and above	5	4.1

SEX

Results in Table 1 show that majority of 55% of the respondents were female. Female were more involved in fruits and vegetables production in the area because it is relatively less laborious and less tasking compared to cultivation of other crops like yam, groundnut, soybeans, rice, etc which most male are engaged in their cultivation. Most of the agronomic practices such as weeding, harvesting, fertilizer application and selling of the produce are mostly done by female which make them participate in large number in producing fruits and vegetables. The production and sell of fruits and vegetables also provide weekly income for the ladies who sell fruits and vegetables and use the money for buying of kitchen utensils and condiments for cooking. This finding is similar to that of [19] who stated that the women are mostly involve in farm activities that are less laborious.

AGE

Results in Table 1 reveal that reasonable proportion (38.2%) of the respondents were between 21- 30 years. This means that the producers were young and very active farmers. Age of a farmer is said to influence farmer's maturity and decision making ability. Age of a farmer also help in making decision on the type of crops planted. Planting of fruits and vegetable crops has to do with age group that is very active because during harvest, fruits and vegetable are harvested between two to three times in a week. This kind of farm activity is more suited for people who are energetic which is why young people were more involved in farming fruits and vegetables.

FAMILY SIZE

Results in Table 1 show that majority 85% of the respondents had family size of between 1- 5 persons. This means that the respondents do not provide for themselves only but also provide for their dependants. Most rural households in Nigeria are large because of the kinship structure and the extended family system. This means extended family system is practise in the study area, where parents and other relations dwell together as a household. The implication of this finding is that a large family size, more family labour would be readily available. This finding is similar to those of [20] who stated that most rural farm families in Nigeria are between 6-10 persons.

EDUCATIONAL STATUS

Results in Table 1 depict that a reasonable (36.7%) proportion of the respondents attended tertiary institution. This shows that there is a relative high literacy level among the farmers. The relative high level of literacy among the farmers could be attributed to the high concentration of tertiary institutions in the study area; there are four tertiary institutions in Gboko town and the quest for acquisition of higher educational certificate which has made many people to enrol for programmes in the higher institution. This confirms [21] who observed that there was relatively high literacy level around Gboko and Makurdi towns as a result of existing tertiary educational institutions in the area.

MAJOR OCCUPATION

Results in Table 1 reveal that majority (60.0%) of the respondents were farmers. In Nigeria particularly in Benue State, a lot of people are engaged in farming on small-scale as their major occupation primarily because the soil is very fertile, the climatic conditions is also good for production of many crops. The involvement of many people in farming in the state has made Benue State earn the slogan ''food basket of Nigeria''. The soil fertility is good for production of many crops which cannot be produce neither in the northern or southern parts of Nigeria.

YEARS OF FARMING EXPERIENCE

Results in Table 1 depict that a major (56.7%) proportion of the respondents had farming experience of between 1- 9 years. Experience is very important in farming business especially when dealing with fruits and vegetables which are perishable agricultural produce. An experience farmer would be aware of when to plant his crops, when to harvest, most agronomic practices required for quality yield. In terms of marketing an experience farmer knows where to get marketing information and when to sell his produce to maximize profit.

Table 2: Distribution of Respondents According to Monetary Value of Produce Lost in a Season

Amount of Money Lost	Frequency	Percentage
≥ 5,000	57	48.5
5,001 - 10,000	24	21.0
10,001 - 15,000	9	7.5
15,001 – 20,000	7	4.8
20,001 and above	23	18.2
Total	**120**	**100**

Results in Table 2 depict that a reasonable (45.8%) proportion of the respondents lost about ($30.5) on annual basis. This could be attributed to non-availability of processing facilities, poor pricing, non-availability of buyers and poor or no storage facilities in the area. When there are no buyers available, fruits and vegetables brought for sale got rotten and spoil in large quantity. Fruits and vegetables get spoilt easily because they contain high water content therefore need proper storage facilities to prevent spoilage; but due to lack of storage facilities, non-availability of buyers among others, farmers' energy is wasted and income is lost. Lack of processing facilities within the production area also leads to non-availability of buyers because if the produce bought there is no facility to process or store it for future use. This implies that money and other resources are lost since there is no market to sell the produce. This confirms [22] which stated that 10 million tons of food per annum conservatively estimated at over ₦825 billion is reported to be lost to spoilage and wastage occasioned by the lack of postharvest management.

Table 3: Distribution of Respondents by Annual Output (Kg)

Quantity (kg)	Frequency	Percentage
≥ 1,000	42	35.0
1,001 - 2,000	26	21.7
5,001 and above	22	18.3
3,001 – 4,000	14	11.7
4,001 – 5,000	9	7.5
2,001-3,000	7	5.8
Total	**120**	**100**

Results in Table 3 show that a reasonable proportion (35.0%) of the respondents produced ≥1000kg of fruits and vegetables on annual basis. This reveals that the respondents were subsistence farmers who produced on small-scale. In most African countries a large population of people are involved in agricultural production at the subsistence level, the practice of agriculture at subsistence level has made provision of farm equipment and machinery difficult, it has also discourage agricultural mechanization. The situation is made worse by inadequate infrastructure, making the processing of raw materials a very difficult task. Also due to lack of application of appropriate technology, the subsistence farmers' output is generally very low.

Table 4: Distribution of Respondents by Factors Responsible for Postharvest Losses

Reasons for Postharvest Losses	Frequency	Percentage
Non-availability of buyers	69	57.5
Poor pricing	32	26.7
Others	15	12.7
Roads not motorable during rainy season	4	3.1
Total	**120**	**100**

Results in Table 4 show that majority (57.5%) of the respondents stated that non-availability of buyers is a major factor responsible for postharvest losses. The absent of agro-processing industries in the area in particular and northern part of Nigeria in general has made many perishable agro-commodities to be wasted in the hands of farmers as people coming from other parts of the country do not reach the market in time as a result of bad condition of roads or deliberately delay as a strategy to get to the market late and buy at cheap price. Also non-availability of many buyers equally creates an opportunity for the few who are in the market to pay lower prices for the produce. These discourage many farmers from planting

perishable crops. This confirms [23] who reported that the problem of inadequate buyers for perishable crops exist in many locations and is accentuated by lack of communication between producers and retailers, and lack of marketing information especially from the angle of the farmers.

Table 5: Distribution of Respondents According to the Most Prevalent Crops Lost During Harvest Season

Variable	Frequency	Percentage
Tomatoes	66	55.0
Pepper	22	18.3
Amaranthus	18	15.0
Mangoes	8	6.7
Okra	6	5.0
Total	**120**	**100**

Results in Table 5 show that majority (55.0%) of the respondents stated that tomatoes were mostly lost during the harvest season. This is due to non-availability of storage facilities and the high water content of the fruit which make them spoil easily after harvest. The wastages that take place during the harvest of fruits and vegetables affect farmers' economic status as the money incurred for production compare to amount of money realized during harvest does not worth embarking on this farm business. This finding collaborates [24] who stated that postharvest loss estimate figure for fruits and vegetables are difficult to substantiate, especially in developing countries like Nigeria. It is, however, estimated that losses as high as about 40-50% to tomatoes and about 20-30% of pepper occur at postharvest storage annually.

Table 6: Effects of Selected Socio-economic Characteristics on Postharvest Losses

Variable	Coef.	t. ratio	Signf.
(Constant)	-	- 0.673	0.502
Age	0.030	0.245	0.807
Level of education	0.168	1.961	0.052
Years of farming experience	0.178	1.465	0.142
Annual income	0.292	3.234	0.002*
Family size	0.142	1.490	0.139
R^2	0.202		

* Significant at 1%

Results in Table 6 show that annual income of the respondents is significant at 1%; this means there is a significant difference between effects of postharvest losses and socio-economic characteristics of the respondents. This means increase in annual income of the respondents will lead to loss of more fruits and vegetables because farmers will produce more and there will be more losses.

CONCLUSION AND RECOMMENDATIONS

In developing and indeed tropical countries, both qualitative and quantitative losses of agricultural produce occur at all stages in the postharvest chain, from harvesting, through handling, storage, processing, transportation and marketing until crops are delivered to the final consumers. Postharvest losses are more serious on perishable crops. It is estimated that Nigeria postharvest losses of fruits and vegetables amounts to 35-45% of the annual production. Hence, the elimination of postharvest losses of agricultural produce is very important to boost food security. In a developing country like Nigeria where that standard of living of many people is very low there urgent need to finding solutions to the problems of postharvest losses for farmers to maximize profit and make fruits and vegetable available throughout the year. It is recommended that government should provide infrastructure for the private sector to establish fruits and vegetables processing industries.

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Marketing et Administration Publique: Apports et limites du Marketing Public en Tunisie

[Marketing and Public Administration: Contributions and limits of public Marketing in Tunisia]

Haykel BEN KHELIL[1] and Néji BOUSLAMA[2]

[1]Doctorant à la FSEG de Tunis, Tunisia

[2]Maître de conférences à la FSEG de Tunis,
Président de l'Unité de Recherche et Applications en Marketing, Tunisia

ABSTRACT: The objective of this paper is to show that Public Administration and Marketing are not two opposing fields. We will try to understand the contributions and limits of the application of the practices marketing to the public sector in Tunisia. We are based on four interviews with public administration agents from different Tunisian Administrations.

KEYWORDS: Public marketing, Public administration, Public sector, Contributions/Limits.

RÉSUMÉ: L'objectif de ce travail est de montrer que l'Administration Publique et le Marketing ne sont pas deux domaines opposés. Nous tenterons de comprendre les apports et les limites de l'application des pratiques de marketing au secteur public en Tunisie, en nous s'appuyant sur quatre entretiens en profondeur avec des hauts conseillers et fonctionnaires des différentes Administrations Tunisiennes.

MOTS-CLEFS: Marketing public, Administration publique, Secteur public, Apports/Limites.

1   INTRODUCTION

L'Administration Publique (AP) et le Marketing ont été toujours considérés comme deux domaines opposés. L'application du marketing dans l'AP remonte à plus de 70 ans où plusieurs chercheurs se sont intéressés à la question de la compatibilité entre l'AP et le marketing. Cependant, la confusion entre ces deux domaines réside au niveau de la divergence de leurs objectifs. Pour l'AP l'*intérêt* de la société prime celui des individus à l'opposé le marketing cherche à répondre aux *intérêts* privés sans s'intéresser aux préoccupations de la société et vise néanmoins à atteindre son objectif financier, le profit (Roux, 2014).

En effet, nous allons montrer dans cette recherche que le Marketing et l'AP ne sont pas exclusifs et que la pratique du marketing dans l'AP prend de plus en plus d'ampleur. Mais malgré l'évolution qu'il a connu, le marketing n'a pas pris une place déterminante et influente dans l'AP.

De plus, cette recherche a pour objectif d'étudier l'importance de l'introduction du mix- marketing (produit, prix, distribution et publicité) dans l'AP d'où notre but est de montrer les principaux apports et limites du marketing dans l'AP.

Pour atteindre les objectifs affichés, nous allons recourir dans la seconde partie de ce travail à une étude qualitative sous forme d'entretien en profondeur réalisé auprès des fonctionnaires de l'AP montrant les opportunités et les limites de la pratique marketing dans le secteur public. Cet apport théorique nous conduit à poser la problématique suivante :

QUELLES SONT LES APPORTS ET LES LIMITES DU MARKETING DANS L'ADMINISTRATION PUBLIQUE ?

DÉFINITIONS ET CARACTÉRISTIQUES DE L'ADMINISTRATION PUBLIQUE :

Premièrement, en se basant sur les normes européennes de la comptabilité nationale, l'INSEE définit l'Administration Publique comme un « ensemble des unités institutionnelles dont la fonction principale est de produire des services non marchands ou d'effectuer des opérations de redistribution du revenu et des richesses nationales. Elle tire la majeure partie de leurs ressources de contributions obligatoires. Le secteur des AP comprend les AP centrales, les AP locales et les administrations de sécurité sociale ».

Pour bien identifier les caractéristiques de l'AP, nous allons recourir à une brève comparaison entre le secteur privé (l'entreprise) et le secteur public (l'Administration Publique). Nous proposons le tableau ci-dessous de Stewart et Ranson, (1988) qui illustre clairement que le secteur public est géré différemment du secteur privé

Tableau 1 : Comparaison entre le modèle du secteur privé et du secteur public

Modèle du secteur privé	Modèle du secteur public
Choix individuel sur le marché	Choix collectif politique
Demande et prix	Besoin en ressource
Action privée à huis clos	Action publique ouverte à tous
Equité du marché	Equité des besoins
Recherche de la satisfaction du marché	Recherche de la justice
Règne du client	Citoyenneté
Concurrence comme instrument du marché	Action collective comme instrument de la politique
Arrêt de la relation comme stimulus	Réclamation comme condition

Source: *Modèle du secteur privé et du secteur public (Stewart et Ranson 1988).*

CONVERGENCE DU MARKETING ET DE L'ADMINISTRATION PUBLIQUE :

- **Marketing et de l'Administration Publique :**

L'application du marketing au sein de l'Administration n'est pas récente. Depuis, 1969 Kotler et Levy ont indiqué que le nombre d'organisations qui ont eu recours au marketing est très élevé. De plus, Kotler et Levy (1969), ont montré que ces deux domaines ont des points communs: « toutes ces organisations sont concernées par l'image de leur « produit » dans les yeux de certains « consommateurs », et elles sont à la recherche « d'outils » influençant la réponse de ses consommateurs ».

Les dimensions ou les outils de marketing sont : le produit, le prix, la distribution et la communication. Cependant, Laufer et Burlaud (1976) indiquent que le secteur public diffère du secteur privé. Le secteur public ne cherche pas le profit, il vise à atteindre des objectifs inhérents à l'*intérêt* général. Au contraire du secteur privé d'où ses produits sont influencés par le souci de la maximisation du profit (Hur et Kim, 2010). En effet, l'AP et le marketing se rapprochent de plus en plus, d'où l'Administration tend désormais à prendre en compte les pratiques de marketing et de sa part, le marketing s'oriente de plus en plus vers le développement des relations client à long terme au sein de l'AP (Morgan et Cleopatra, 2013). Dwyer et al. (1987) considèrent que l'absence de la concurrence pour l'Administration Publique explique en une grande partie la négligence de l'intégration du marketing et la considère de ce fait utile que pour le secteur privé.

- **Différences idéologiques entre le Marketing et l'Administration Publique :**

La revue de la littérature nous propose deux principales différences idéologiques entre le marketing et l'Administration Publique. La première différence concerne le marketing qui est basé sur la relation-client et qui vise à traiter les clients d'une manière individuelle alors que l'AP, par définition, vise à traiter chaque citoyen de la même manière (Alford, 2002). La deuxième différence c'est que l'AP doit agir en fonction de la politique générale du pays, elle réfère à un pouvoir plus fort qui établit les lois et les plans d'actions, donc l'AP n'est pas elle qui prend la décision finale (Clarke, 2006). Par contre, le

marketing possède un statut indépendant qui n'est pas influencé souvent par les décisions politiques, il contribue donc à l'application des théories et à la prise des décisions finales.

En effet, l'AP doit servir le maximum des citoyens de façon égalitaire. Cette notion d'égalité des citoyens s'oppose avec le marketing et notamment avec la notion de marketing relationnel (Djelic Marie-Laure, 2004).

- **Apports et limites du Marketing dans l'Administration Publique :**

Nous présentons les principales opportunités et limites du marketing au sein de l'Administration Publique à travers le mix-marketing (Bordon, 1964). Nous utilisons la figure 1 comme schéma synthétique qui nous permet d'examiner les apports et les limites du marketing dans l'Administration Publique. Les dimensions les plus utilisées dans un mix-marketing sont le produit, le prix, la distribution et la publicité qui sont appelés aussi les « 4P » (Kaplan et Michael, 2006). Le mix-marketing ou bien le marketing opérationnel correspond à « l'ensemble des outils tactiques actionnables (le produit, le prix, la distribution et la publicité) à disposition de l'entreprise pour répondre aux demandes du marché cible » (Kotler et al. 2005). Nous présenterons une brève présentation pour chacun de ces variables et la manière de leur application au sein de l'Administration Publique.
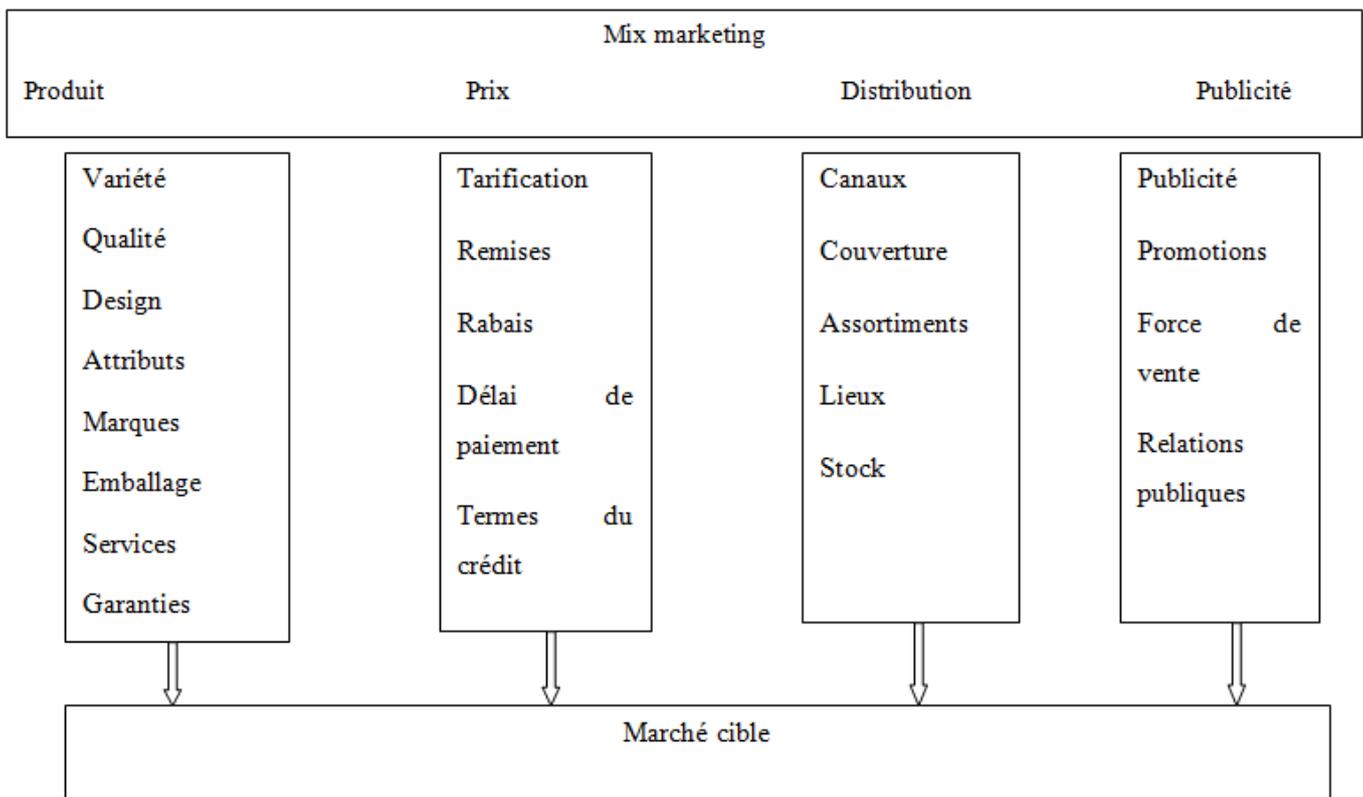
Figure1: Les variables du mix-Marketing dans l'Administration publique

Source : Le mix-marketing (adapté de Kotler et al. 2005).

PRODUIT :

Un produit est « tout ce qui peut être offert sur un marché, pour que l'on y porte attention, que l'on cherche à l'acquérir, qu'on en fasse usage ou qu'on le consomme de façon à satisfaire un besoin ou un désir. Sont inclus des objets physiques, des services, des personnes, des lieux, des organisations et des idées. » (Kotler et al. 2005).

La création de produit se fait rarement dans le secteur public. Les nouveaux produits sont développés par les hommes politiques ou suite d'une forte demande par la Société. Bon et al, (1978), montrent que « c'est le niveau politique qui définit les besoins...et qui fixe ce qui est bon ou mauvais pour le public ».

La principale limite dans la dimension « produit» réside dans l'étude préalable du comportement du consommateur avant la création d'un bien ou d'un service. Cependant, dans le secteur public il est très difficile de connaitre les désirs et les souhaits des citoyens, comme on le fait dans le secteur privé (Kaplan, Schoder, Haenlein, 2007).

PRIX :

Selon Kotler et al. (2005) « Le prix est le montant à payer pour un produit ou un service, ou la somme des valeurs échangées par les consommateurs pour bénéficier de l'acquisition ou de l'usage d'un produit ou d'un service ». Dans le secteur privé, le prix devrait permettre à l'entreprise de maximiser ses profits et de réaliser ses objectifs financiers. Cependant, l'AP offre des services gratuits ou quasi-gratuits qui ne couvrent *même* pas leurs coûts de production, le secteur public a donc un but non lucratif. Parmi les limites qui sont associées à la dimension « prix » est l'absence de la concurrence puisque l'AP est en situation de monopole. De ce fait, nous trouvons des produits standards et conformes avec des prix négligeables (Xia et al. 2004). Cette conformité peut influencer sur la qualité des produits et services car en général un service de luxe et de bonne qualité aura un prix élevé.

DISTRIBUTION :

La distribution est l'ensemble de « toutes les activités d'une entreprise visant à rendre le produit ou le service disponible pour les consommateurs ciblés » (Kotler et al. 2005). La distribution renvoie alors aux différents circuits d'acheminement du produit aux clients. Cette dimension est très importante car si le client ne peut pas accéder au service offert par l'AP, le service sera inutile et ne vaut rien. La principale limite de la dimension « distribution » est l'utilisation limitée des Nouvelles Technologies de l'Information et de Communication (NTIC). De ce fait, la distribution devrait renforcer des mesures de sécurité et de contrôle afin de développer davantage la distribution sur Internet. Mais, il faut mentionner aussi que l'Internet n'est pas accessible pour tous les types de services. Nous citons l'exemple de la délivrance des cartes d'identités et les passeports d'où il serait parfois nécessaire de faire appel à une personne physique pour assurer la sécurité.

PUBLICITÉ :

Kotler et al, (2005) considèrent que « la publicité correspond aux choix de force de vente, de promotions des ventes et de relations publiques qu'une entreprise doit faire pour atteindre ses objectifs de publicité et de marketing ». La communication est un élément indispensable en marketing car il ne suffit pas d'avoir un bon produit, de fixer son prix et le mettre à disposition des individus. Les organisations devraient communiquer avec les consommateurs actuels et potentiels.

Parmi les limites de la publicité est le fait que la communication ne reste pas souvent neutre surtout dans les sujets qui touchent le domaine politique. Le rôle de la communication est seulement d'informer et ne doit pas créer une image (O'Shaughnessy, 2001).

MÉTHODOLOGIE :

Notre objectif est de confirmer le soubassement théorique à la réalité de l'Administration Publique et de combler les insuffisances théoriques par une étude qualitative basée sur des entretiens approfondis.

Nous avons mené notre étude auprès de quatre fonctionnaires. Le choix des répondants était basé sur la différence du secteur, de fonctions et du genre. Nous avons donc décidé d'interroger quatre fonctionnaires de différentes Administrations. Voici les caractéristiques des répondants:

1. (Homme): Conseiller et contrôleur des dépenses publiques au Gouvernorat de Bizerte- Contrôleur d'Etat.
2. (Femme): Conseillère et contrôleuse des dépenses publiques au Gouvernorat de Bizerte- CSP.
3. (Homme) : Administrateur dans le Ministère de la Santé à Tunis.
4. (Femme) : Administrateur Conseiller dans le Ministère de la Santé à Tunis.

Nous avons élaboré un guide d'entretien contenant huit questions. La première question a pour objectif d'assurer la compréhension des répondants à la notion du marketing. Nous avons posé la question suivante : « c'est quoi selon vous le marketing ? »

Après avoir assuré que les répondants ont une idée sur la notion de marketing (il y a deux parmi les répondants ont étudié le marketing à la faculté). Nous avons demandé aux répondants par la suite d'exprimer leurs attitudes envers le marketing en leurs posant deux questions relatives aux opportunités et aux limites du marketing au sein de l'Administration

Publique. Enfin, nous avons interrogé les répondants sur leurs attitudes envers le mix- marketing. Pour ce faire, nous avons posé quatre questions qui sont relatives aux « 4P », c'est-à-dire pour le produit, le prix, la publicité et la distribution.

Résultats :

En testant leurs attitudes envers le marketing, nous avons remarqué que tous les répondants avaient une attitude favorable vis-à-vis le marketing. Le conseiller de contrôle des dépenses publiques (CDP) a considéré le marketing comme une fonction commerciale primordiale dans la survie de l'entreprise. La conseillère (CDP) pense que le marketing est une pratique managériale moderne et qu'il faut la développer davantage dans tous les secteurs (privés et publics). Les fonctionnaires administrateurs dans le Ministère de la Santé (MS) ont montré aussi une attitude positive envers le marketing et ils affirment que leurs attitudes ont évolué au fil du temps. Ces deux fonctionnaires indiquent que le marketing est une fonction vitale puisqu'elle affecte l'image de l'entreprise « l'image de toute entreprise est affectée par la fonction du marketing ».

Nous présentons les définitions données par nos quatre répondants: pour le conseiller de (CDP) « le marketing c'est l'art de vente… ». D'où le marketing n'est pas basé sur des simples transactions de vente mais la manière de persuader le consommateur de l'utilité du produit ou service. Pour la conseillère de (CDP) : « la base du marketing c'est la communication », d'où la communication et la publicité jouent un rôle indispensable en marketing « sans communication le client ne peut pas être informé par les services de l'AP ». La fonctionnaire du (MS) a parlé de l'importance du marketing relationnel « le marketing c'est l'ensemble des stratégies pour entretenir une relation durable avec le client ». Pour le fonctionnaire du (MS) qui a une expérience dans le secteur privé, indique « pour qu'il soit efficace, le marketing doit bien étudier le comportement du consommateur pour savoir cibler les produit vers les besoins des consommateurs ».

Concernant les opportunités du marketing au sein de l'Administration, tous les répondants ont évoqué l'importance de la communication et son influence sur le public. Le conseiller de (CDP) a apprécié les campagnes de publicité qui visent à la sensibilisation des gens et contribuent à atteindre l'intérêt général, il a cité l'exemple des campagnes anti-tabac. Pour la conseillère de (CDP), le marketing a un objectif social et informatif d'où il permet d'informer les citoyens sur les services offerts par l'Etat. Elle a cité l'exemple, le cas des services offerts par la Caisse Nationale d'Assurance Maladie (CNAM) et la Caisse Nationale de Retraite et de Prévoyance Sociale (CNRPS). Elle ajoute, « l'information sera pertinente lorsqu'elle s'adresse aux personnes dont les revenus et les niveaux d'instructions sont les plus faibles et ne savent pas quels sont les services auxquels ils peuvent bénéficier ». Pour les fonctionnaires du (MS), le marketing peut jouer un rôle politique, ils le considèrent comme « un bon vecteur pour développer le processus démocratique surtout après la révolution tunisienne et cela en instruisant un public qui est très hétérogène ». De même, « le marketing politique peut lutter contre la violence et les agressions physiques et verbales ».

A propos les limites, chaque interviewé a avancé un point de vue particulier. Pour le conseiller de (CDP), la limite du marketing c'est « qu'il est utilisé parfois pour des raisons de lavage de cerveau de certains jeunes ». Cette limite apparait clairement à travers certains programmes qui invitent des gens qui font appel à la violence et aux terrorismes. Il a cité l'exemple de l'émission « liman yajro fakat sur la chaine Ettounsyia TV ».

La conseillère de (CDP) voit une limite très grave qui est liée aux campagnes de communication. Elle affirme qu'il y a des spots publicitaires qui touchent à la morale, à l'éthique et même à la religion. Elle a cité l'exemple de la campagne de publicité de Benetton mais elle revient à dire « heureusement nous n'avons pas en Tunisie des campagnes de publicité vulgaires mais l'Administration doit être vigilante, d'où certains programmes doivent être *précédés d'un avertissement acoustique et aussi la présence d'un symbole visuel tout au long de la durée du programme afin* de protéger les mineurs contre certains programmes audiovisuels qui peuvent nuire à leur épanouissement ».

De plus, les fonctionnaires du (MS) voient comme limite du marketing le fait qu'il est très focalisé sur la publicité et qu'il fait l'affaire que des fonctionnaires « le marketing n'équivaut pas seulement la publicité…comme il ne doit pas être l'affaire de chaque fonctionnaire, mais plutôt d'un département indépendant au sein de l'Administration où il doit concerner principalement les experts… ».

Nous allons examiner les attitudes des fonctionnaires envers le mix-marketing (produit, prix, publicité et distribution).

Les produits: le conseiller de (CDP) considère que le marketing au secteur public est similaire qu'au secteur privé. Cette similitude s'observe notamment au niveau de l'adaptation du produit selon les besoins et les désirs des clients « le marketing est un potentiel pertinent car il est basé sur l'écoute du public et offrir en conséquence des produits appropriés et adéquats ».

La conseillère de (CDP) voit que « certes les produits et services de l'Administration devraient être standards et conformes pour répondre aux besoins et attentes de la majorité de citoyens…mais le problème c'est qu'il n'y a pas des stratégies de différenciation et diversification des produits pour répondre aux souhaits spécifiques des clients ».

L'administrateur du (MS), considère que le marketing est un bon moyen qui aide l'Administration à améliorer la qualité de ses produits et services en renforçant la proximité et l'écoute des citoyens. Ainsi, ce dernier voit que le problème de l'introduction de la notion de service au marketing est lié à la différence de la qualité du service offert au secteur public par rapport au secteur privé « la qualité du produit ou de service au secteur privé est meilleure que celle du secteur public ». L'administrateur conseiller du (MS) ne voit pas des apports et des limites quant à l'application de la dimension produit/service à l'Administration Publique.

Prix ou tarification: pour le conseiller de (CDP), il est pour l'idée de l'application de la tarification à l'Administration. Il indique que l'Etat assure gratuitement aux citoyens les fonctions régaliennes (sécurité, défense et justice) mais en contre partie il doit exiger la tarification de certains services comme le passeport, la carte d'identité,… et il ajoute « les revenus de la tarification seront considérés comme un facteur de redistribution des richesses ».

Les même propos pour les autres fonctionnaires: la plupart des services de l'Administration sont quasi-gratuits et ne couvrent pas leurs _coûts._

D'après les répondants la seule limite de la tarification est liée principalement à la qualité médiocre des services offerts d'où l'un des répondants affirme « je suis prêt de payer plus chers afin d'accéder aux services de meilleure qualité ».

La distribution: tous les répondants trouvent que la distribution est la dimension la plus importante à l'application du marketing. Tous les fonctionnaires insistent sur le fait que les produits et services de l'AP n'ont aucune valeur et utilité s'ils ne sont pas distribués. Pour le conseiller de (CDP), la distribution est non seulement l'acheminement du produit aux clients qui se trouvent dans les régions où se concentrent les Administrations, mais aussi il faut tenir comptes aux régions qui sont complètement dépourvues des Administrations. Il cite l'exemple « En **Tunisie, en période de la révolution** le Gouvernement a trouvé des difficultés de faire parvenir aux réfugiés au ''Dhhiba' les soins et médicaments nécessaires ». Une autre limite observée quant à l'application de la dimension distribution est l'absence de concurrence, « il n'ya pas des concurrents avec l'AP au niveau de la dimension distribution ».

La publicité: tous les répondants ont mis l'accent sur le _rôle_ important de la communication dans l'Administration Publique et ne voient aucune limite, que des opportunités. L'administrateur conseillé du (MS) souligne qu'il y a eu une évolution dans la communication après la révolution, « le problème de la confidentialité des informations n'existe plus ».

C'est aussi ce que pense le conseiller de (CDP), pour lui la communication a connu des améliorations profondes _grâce_ à la révolution, il a cité le décret-loi n° 41 du 26 mai 2011, relatif à l'accès aux documents administratifs des organismes publics. Ce décret-loi s'inscrit dans le cadre de _l'OPEN-GOVERNMENT_ qui est basée désormais sur la transparence et la gestion participative des citoyens dans les affaires publiques et ce qui renforce en conséquence _l'E-DEMOCRATIE_ et _l'OPEN-DATA_. Dans le _même_ cadre, l'administrateur du (MS) ajoute que les Nouvelles Technologies de l'Information et de Communication (NTIC) ont contribué au développement de _l'E-GOVERNMENT_ ce qui a permis d'atteindre de plus en plus des gens et a facilité la transmission de l'information au public. La limite de la communication publique est liée à la confidentialité des secrets de l'Administration. La conseillère de (CDP) indique que « certes _grâce_ à la révolution nous avons pu accéder à toutes informations sur la structure organisationnelle et les programmes gouvernementaux des AP, mais il faut garder des informations confidentielles qui touchent à la sécurité du pays » et elle ajoute « …trop d'informations tue l'information ».

En résumé, tous les répondants expriment une attitude favorable envers le marketing d'où les opportunités et les apports dépassent les limites. Les dimensions de communication et distribution leur semble indispensable en marketing, alors que la dimension de prix leur semble assez difficile à comprendre puisque la majorité des répondants affirme qu'il est difficile de parler de la tarification en marketing public car l'Administration ne cherche pas à réaliser des bénéfices à l'opposé du secteur privé où la maximisation des profits est le souci de chaque manager.

DISCUSSION ET CONCLUSION :

Cette présente étude nous a permis d'identifier les caractéristiques du marketing dans l'Administration Publique. Nous avons montré à travers la théorie comment ces deux domaines s'accordent mieux aujourd'hui. Dans la revue de la littérature, nous avons présenté la convergence du marketing et de l'Administration Publique et une brève présentation des apports et limites du marketing au sein de l'AP.

Afin de bien comprendre la relation entre ces deux domaines, nous avons mené une étude qualitative qui contient quatre entretiens avec quatre cadres de l'Administration Publique, à propos de leurs attitudes envers le marketing et sur ses opportunités et limites.

L'objectif principal de ce travail était de montrer que le marketing et l'AP ne sont pas deux domaines opposés. L'application du marketing public ne nécessite pas la mise en place d'un nouveau marketing spécifique mais plutôt il s'agit d'adopter une autre vision de la discipline du marketing pour qu'elle soit bien appropriée au secteur public. Nous prenons l'exemple de la dimension prix qui est une dimension très importante en marketing dans le secteur privé (Wyner 2002), alors qu'au sein de l'AP, elle joue un rôle insignifiant et même elle est difficile à mettre en place. Ainsi, pour cerner l'applicabilité du marketing au secteur public ou privé cela est tributaire de la définition du marketing que la nous retenons. Si nous prenons par exemple la définition de Morgan et Cleopatra (2013) et Kotler (1982), considérant le marketing comme « surtout concerné par la façon dont les transactions sont réalisées, stimulées, facilitées et valorisées ». A travers cette définition le marketing apparait applicable au secteur public. Cependant, lorsque nous retenons la définition du *British Institute of Marketing*, qui définit le marketing comme un « processus de gestion visant à identifier, anticiper et satisfaire les exigences du client de façon rentable ». Cette définition montre l'importance de la notion de la rentabilité ce qui est compatible avec le secteur privé plutôt qu'à l'Administration Publique.

En effet, nous pouvons déduire que le secteur public se considère toujours comme l'opposé du secteur privé. En outre, l'Administration Publique devrait s'inspirée du secteur privé et être plus proche aux pratiques du marketing (Walsh 1991). D'après les entretiens que nous avons faits, nous remarquons que les fonctionnaires et les cadres n'ont pas une définition claire de marketing, pour eux le marketing est basé principalement sur la communication et que le produit, prix et distribution ne sont pas assez important au secteur public. Cependant, l'Administration Publique devrait rester vigilante et ne pas considérer le marketing un remède magique pour tout type de problème au sein de l'Administration. Ainsi, le marketing est seulement une fonction d'une gestion dans le secteur public.

Au final, nous évoquons d'autres notions utiles pour le marketing et qui sont absents dans la littérature de l'Administration Publique sont la négociation (Harris et al, 1996), et l'importance des réseaux politiques et les groupes d'influence (Smith 1993; Richardson 1993). A travers ces concepts nous pouvons comprendre la manière de la prise de décision et le comportement des citoyens.

LIMITES ET VOIES FUTURES DE RECHERCHES :

Tout d'abord, ce travail doit être considéré comme une première étape pour étudier la relation entre le marketing et l'Administration. La limite la plus importante apparait clairement dans le l'absence de l'examen d'un certain nombre des détails. Si nous prenons l'exemple de la dimension communication nous remarquons que la plupart des répondants se sont contentés sur la publicité alors en revenant à la définition du mix publicité de Kotler et al. (2005) nous retrouvons que tout communique dans une organisation « tout ce qui a trait à une organisation véhicule un message : les clients se forgent des impressions sur l'organisation à travers ses équipements, ses employés, ses fonctionnaires, le papier à en-tête et une centaine d'autres substituts de l'entreprise » (Kotler et Levy 1969). Une autre limite associée à ce travail c'est qu'il a étudié seulement l'aspect opérationnel du marketing (mix-marketing), d'où le traitement de marketing stratégique (segmentation, ciblage et positionnement) aurait pu enrichir notre étude. Une autre limite concerne la taille de l'échantillon car un échantillon de taille plus élevée et diversifiée serait intéressant de comprendre les attitudes des cadres de l'Administration envers le marketing.

Pour les voies futures de recherche nous citons l'importance de la dimension politique dans le secteur public. Afin de développer davantage le domaine du marketing politique, nous proposons aux lecteurs certaines références bibliographiques comme Butler et Collins (1994, 1996), O'Cass (1996), Egan (1999), O'Shaughnessy (2001) et Shama (1975).

De plus, l'Administration Publique de demain est une Administration « stratège » elle n'est plus focalisée sur des simples transactions ponctuelles : L'Administration est désormais pilote et commanditaire. Dans ce cadre, nous proposerons d'étudier dans des travaux de recherches futurs le nouveau rôle stratégique de l'Administration Publique qui devrait *être* basé sur la pratique marketing, la conception et le pilotage.

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ANNEXE 1. GUIDE D'ENTRETIEN

1. Pouvez-vous définir le marketing ? Que représente le marketing pour vous ?

2. Quelle est votre attitude envers le marketing ?

3. Quelle opportunité le marketing offre à l'Administration Publique ?

4. Quelle est la limite du marketing au sein de l'Administration Publique ?

5. Un produit est tout ce qui peut être offert sur un marché, pour que l'on y porte attention, que l'on cherche à l'acquérir, qu'on en fasse usage ou qu'on le consomme de façon à satisfaire un besoin ou un désir. Sont inclus des objets physiques, des services, des personnes, des lieux, des organisations et des idées. La conception d'un produit et son amélioration est l'une des quatre fonctions du marketing.

a. **Quel est le potentiel du marketing au sein de l'Administration Publique ?**

b. **Quelle est la limite du marketing au sein de l'Administration Publique ?**

6. Le prix correspond au montant demandé pour un produit ou un service, ou l'ensemble des sommes que les consommateurs échangent de façon à posséder ou utiliser le produit.

a. **Quel est le potentiel du marketing au sein de l'Administration Publique ?**

b. **Quelle est la limite du marketing au sein de l'Administration Publique ?**

7. La distribution correspond à toutes les activités d'une entreprise qui permettent au produit ou au service d'être disponible pour la clientèle cible.

a. **Quel est le potentiel du marketing au sein de l'Administration Publique ?**

b. **Quelle est la limite du marketing au sein de l'Administration Publique ?**

8. La communication et le mix de la publicité correspondent aux choix de publicité, de la force de vente, des promotions des ventes et des relations publiques qu'une entreprise doit faire pour atteindre ses objectifs de publicité et de marketing.

a. **Quel est le potentiel du marketing au sein de l'Administration Publique ?**

b. **Quelle est la limite du marketing au sein de l'Administration Publique ?**