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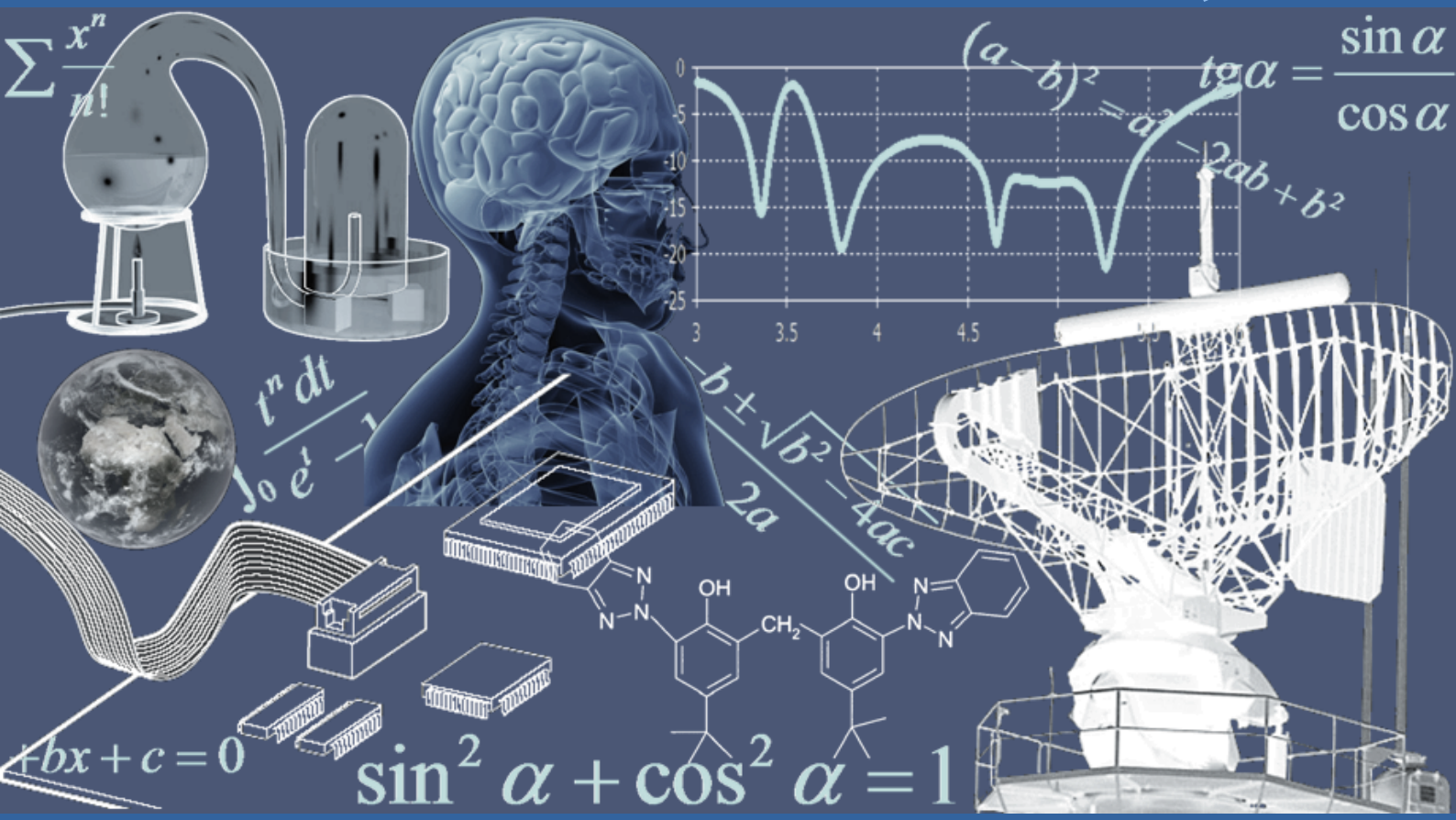

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Academic Use of Online Social Networks

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ABSTRACT: Now a day with the Internet revolution, the online business has been one of the most popular and efficient marketing methods. The change of the economy has the biggest impact on the business method. For example: social networking and its influence, shopping type, creativity, and create a new business environment.
Electronic business shows the success in the marketing over the world. Also, it becomes the promised feature of having deployed ideas in order to introduce products or services over the global.
The online services have been the most modern and convenient terminologies among the people using the social networking. When the social network has a hug influence on this kind of marketing, for example Facebook. We just heard about the Face book ten years ago and after four years only; the Twitter was launched. Those famous websites are the best examples can support the social networks. It was unbelievable in that time those billions of people will spend most their time on Face book. The most important thing, the market people started taking advantage of these social sites and make their own business. Moreover, many of them make a good investigation and develop good ideas.

KEYWORDS: Online-business, marketing, Social Networks, Online services, Facebook.

1 INTRODUCTION

Social Networks have a high impact on the marketing world. It becomes the most powerful tool over the commerce for attracting the customer. Recently, it becomes the most efficient tool uses in the market to effect the customer's decision of purchasing any product or service.

Even the big and known companies are using these online methods "social network tools" to spread their products and to announce about any new service. In order to keep up these services available and interesting; the companies need to know how to control these sites.

For the customers, the social networks are more trusted than promotions because they can express the reality more than the marketers [1, 2]. So, by using the social networks sites; the marketers can contribute in the conversation and share their information [3].

1.1 ONLINE-SOCIAL NETWORKS DEFINITION

These networks are online tools use for communication and sharing the activities and interests. Emails, blogs, newsfeeds [4] are all different provided tools of interaction ways that the people use to communicate with each other over these networks [5, 6]. That proved their straight over the communication side. The most known online social networks are the Face book, Twitter and LinkedIn for professional people [7]. The communication usually starts after creating the profile.

People start to setup their profile by filling their own information and expressing their interests. Based on this information, the user gets invitation from other friends who have same interests.

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However, most websites require the friend relationship for providing linking service and sharing the activities over that network [8]. After the linking service done, the user will be able to join his/her friends and update them with the new information and activities. That leads to a fact that users manage to self-organize through life stage, attraction and more. These systems propose an exceptional opportunity for greatly aimed marketing.

1.2 SOCIAL NETWORKS INFLUENCE ON ONLINE MARKETING

As known the online users like to join in groups and share their experiences about any service or product over their network. The sound of that recommendation or opinion has more influence than the marketer messages. Previous studies show that more than 78% of online customers trust the others experience than watching the advertisements in order to buy any product or get service. According to number of researches, it is more impartial to get others opinion than the marketers' messages. So, whenever the customer is willing to buy or try a new product; he/she starts to use the social networks resources to find a sufficient answer.

Social networks associates operate two characters which content supplying and consuming [5]. So, the consumer and supplier can be same person but for different services. In case the proper influencers are caught with a communication that detect as appreciated, then it can be easily improved as habitual. This process is smart in which the purchaser does not feel the market influence on his/her decision because he/she got this recommendation over trusted network [9, 10].

2 RESEARCH METHOD

Our main point of this research is based on students' observation, assessment as well as the positive and negative effects of social networks sites in academic resolution. We have used for data collection the survey method. Our study population involves University of Bridgeport students, Connecticut, USA.

So, in this research we are trying to solve an important issue that graduate students face; which is an unavailable service inside the university. Hence, this service is about providing the tutorials with reasonable price. By that we could raise the issue according to the target people opinions and provide the acceptable solution.

Based on above explanation, we have used two different kinds of research methods. First one is the small survey to explore the range of the issue using specific questions [11]. Second method is the study case for the proposed solution. Furthermore, the applied methods' purpose is not about the finding of academic use of social network, but it is also for making a change for the addressed issue in order to make improvement in the particular system which we are going to use; as well as making a recommendation based on the feedback.

2.1 SURVEY METHOD

We have used the survey approach with different number of students at University of Bridgeport. The main purpose of this research is to highlight the issue that most of the graduate students face with writing their researches; and its solution would be providing a tutoring service for them. However, the university provides this service only for undergraduate students.

So, we have prepared number of questions that were asked for the graduate students. Then we have chosen both the native and non-native students to restrict the issue and make it narrower. Our questions were based on specific strategy to know how we will use this service and how many students in need of an online tutorial service. If this idea will be welcome by the students or it is useless.

2.2 CASE STUDY

Usually, the case study is to be used in purpose of understanding the phenomenon behind the issue [12]. It is used for either finding a new idea or deploying an existing approach. However, this useful method requires evaluation of real situations.

Case study usually is restricted where the observed review of number of sources can help in explore the main idea. The research methods are emerged in order to understand the main problem using specific reports of previous studies. The case study is considered as one of quantitative research methods for providing deep understanding. However, two issues can face the case study such as: limitation due to geographic edges and the number of members or situations need to be studied.

The research purpose is to study the limited services issue at University of Bridgeport and try to provide the solution online for more convenience using the social networks websites. Therefore, we are going to use the case study on Face book website since the Face book is the most popular and known social website.

It is very important to understand the concept of case study method because some people misunderstand it. When the researcher use case study that means that person is working on number of sources and he is willing to focus on a single situation. However, the following case study focus on the Facebook history, advantages, disadvantage as well as how to take advantage of this social service.

2.2.1 CASE STUDY OF FACE BOOK SITE

In 2004 and from a school dorm at Harvard, the Face book website was launched as a social network [13, 14]. It was only for Harvard students use. After some time Face book becomes the second biggest social website use online over the world. Now a day, it is extended to allow more than 500 million users have account on Face book. What make the Face book more uniquely is the market and user base support.

However, Mark Zuckerberg who was a student at Harvard collage introduced Face book. Face book was only a sideline project of Mark Zuckerberg. He was lucky of getting a financial funding from Saverin until this website was around the campus. Then it became well-known over the world. Mark Zuckerberg received a hug support of two friends "Dustin Moskovitz and Chris Hughes" who dropped out of their college just to run out the Face book. In 2005, Face book has facebook.com domain for $200,000 in order to make it wide available [15]. When other competitors such as: MySpace, Xanga keep their websites are restricted in only familiar schools [16], universities, colleges due to the users number limitation.

3 PROPOSED IDEA

3.1 CREATING AN ONLINE-BUSINESS

With online services and online websites features, the actual marketing meaning has been totally changed. So, less money with less effort and less time become the marketers' first requirements or hops.

According to Galagan research, 60% of people use the social network sites when 70% who tweets and recite the blogs [17].

Face book creates a big movement in marketing network. So, instead of using it as social network, it starts to be a business gateway. Cooley explains in his paper, which is titled "Social Networks and Face book" [18], that the Face book has big influence on the business. So, the company can create its own page and collect a hug number of followers to increase its chance of selling the introduced products or services.

Similarly all the companies start to have their own page and make number of fans for faster support and easier marketing way to introduce their business. These companies always work on maintain a good relationship between the fans and marketers. In marketing department, Face book starts to be considered as known strategy of business. With using the free page, the company can introduce its business and products for the users and try to attract them. So, if the user loves the product; then it will be easy to go to the company website and get more information about the desirable product.

Our main idea in this research is finding an appropriate solution for unavailable tutorial service at University of Bridgeport for the graduate students. This service is provided for undergraduate students. However, based on our survey; we realize many students spent much money just for reviewing their assignment or researches.

As known, writing is not an easy skill for either the native and non-native students. The students have to have a solid foundation in grammar side. Most of the students even the native students have issue in grammar because most of the graduate students return after long time to the classes. Other issues with the non-native students especially the Chinese or Arabic students have a lot of difficulties due the language differences. Chinese language uses characters that are totally different from English language. When, Arabic language uses different style and different letters. In English language people write from left to right when in Arabic language the people write from right to left.

Considering to these issues, it would be a good idea if we can take advantage of Face book service in providing us a free page. This page can be used for online tutorial to help the students in correcting their assignments and fix the grammatical mistakes in their researches. In addition, the student needs to submit his/her assignment one week before the due date. So, by that we can make the changes and discuss with the student to show him/her the mistakes. This service will be for reasonable price instead of spending a lot of money in services offices who take advantages of non-native students.

If the students submit their assignments in less than one week than the charge will be 10% higher.

Furthermore, we are not only going to help the student in correcting or fixing the researches, but also we are going to have a discussion to show him/her how the work is done.

Later, if we found hug of interested students; we can add more services such as: online classes, Videos, helpful material for each class. The student can order this material based on his/her requirement.

By that we can make an online Business with no capital requirement. Only the time is required, following the fans and run out the page. Finally, in our opinion this idea can be grow very fast; it needs a social network creation by having a good relationships inside the university.

3.2 THE ACADEMIC USE OF SOCIAL NETWORKS MODEL

Online marketing provides hug services and it is considered to be more convenient for people who have no time. If we just look to some trusted websites such as: eBay or Amazon we can clearly observe the billions of people who visit their pages either to sell or buy. Internet brought many advantages for non-developed companies. It produces a real business with no boundaries.

The concept of scientist about the online business is the online- Business obviously supported by the marketing Department [19, 20]. As known the tradition marketing start to not have this attention comparing to department of online marketing.

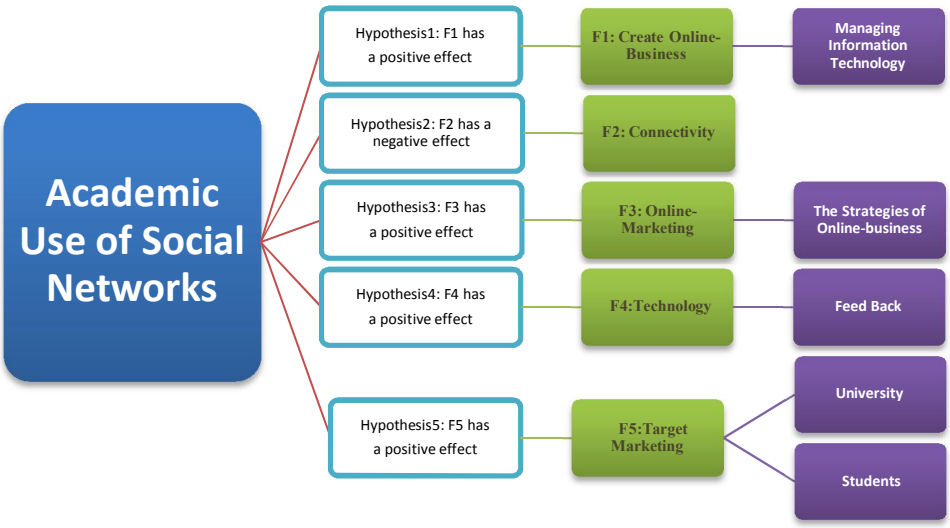

Fig. 1. The Academic Use of Online Social Networks Model

3.2.1 THE GOAL OF THE ACADEMIC USE OF SOCIAL NETWORKS

Using the online social networks sites in educational side motivated many researchers in the social science due to its benefit for people who cannot attend their classes regularly or having issue with some classes. Many ideas were introduced to improve the academic need using the online social network sites over different levels [21]; **"Distance education can be regarded as mediated form of education relying on various forms media and technologies [22]"** When using the social networks sites can have a big negative influence on the universities' education. According to Armstrong & Franklin's research, most of the universities will lose their rights for being the honored role as education provider since these service will be widely available and more flexible [23].

However, there are many reasons and benefits make us toward to social networks use such as: justifying better education, learning experiment enhancement, continuous availability of educational services for students and having quick feedback [24]. Furthermore, these kind of sites can be considered as faster communication way. The students and instructor can communicate everywhere and anytime. One of suggested sites is the Facebook for having a reliable communication [25].

3.2.2 FACTOR1: CREATING ONLINE BUSINESS

Based on our survey creating Business using social networks sites can have huge advantages for graduate students. Researchers are seeing using the social networks sites can having a negative effects on the traditional education. They realize the impact of the students feeling with having online instructor on Facebook as well as the relationship; yet **"participants emphasized possible negative associations between teacher use of Facebook and teacher credibility [26, 27]"** Most of education departments' librarians are against using kind of these sites in the universities which make issue like this as a big challenge of using social networks sites for higher education [28].

In addition, online business starts to replace the tradition business due to its advantages [29]. People start to prefer these kinds of sites due to their limited time. So, they are able to order anything in five minutes just using smart phones, laptop, or iPod. So, it becomes much easier. Same thing if we used these services for online education to provide service that unavailable in the university like the suggested solution "online tutorial" to correct and help students in their assignments. This service can be provided for a reasonable price. That can return two advantages: first creating a business based on a society with no money need. Second is helping the students in keeping themselves in their classes and raising their grades. Online business can also help the marketers.

The use of online business can be considered as an information management tool. This tool can contain three mechanisms:

1. The online business implementation and improvement management as well as the approach of information technology.
2. Employing the new information technology and online business application management.
3. Information processes' management and organization. This feature can help the people managing their business and show them how to attain their goal [30].

3.2.3 FACTOR2: CONNECTIVITY

According to Haythornthwaite, the connectivity of the Internet can have disadvantage as it has advantage. That because he stated, **"The very nation of community in an online context can being a hot debate [31]"** People start to lose their relationships with their families and friends. All their relationships are restricted in online communications [32, 33]. If this service disconnected due to any urgent, these relations can be stopped. Regarding to his argument, the people who use kind of these sites have stronger relation even if they are not known people for us [20].

So, if the resources are available then the relation remain strong unless that the relation can be destroy or get less interest.

However, Haythornthwaite explains that the Internet connectivity has a good advantage for online students. But it can have disadvantage for them in case of disconnecting these resources due to any urgent such as: weather issue or connection issue. That is the most consideration in our research. If the connection is not available then the student will not be able to communicate with the instructor and the process will be stopped and the students cannot get their work on time.

3.2.4 FACTOR3: ONLINE MARKETING

Introducing the products and services is more flexible and easier by using the social networks sites. When these sites are available over 24 hours. These services can be spread out using just the relationships between the fans and their friends [34]. So, it can be spread out easily with more influence because the talker about the service or product is a friend who is trusted party. So, it was right what Wilsom said, **"Social networks do have the potential to become business enablers if you get to know them well enough [35]"** When Trusov emphasizes in his paper that the electronic invitation over social networks sites replace the tradition marketing and give a better results [36].

So, to make our idea successful; we are following the marketing expression that says, "Sell anything, anywhere, anytime, at any price".

Based on that, this factor can have a good effect on our proposed service. If we spread our page link over the university students and each student has number of friends who are also students then the business of creating Facebook page for online tutorial, will be wilder and more popular. So, our business can grow very fast.

To make this idea efficient there are some roles need to be stated for successful business. Which are:

1. Include your business in the new economy manner.
2. The efficient marketing way now is the online business.
3. Rearrangement the Value Chain.
4. Keep following your business.
5. Guarantee the protection availability over your business.
6. Follow the five important rules of e-marketing "Sell anything, anywhere, anyway, anytime, for any price".
7. Keep following all the new marketing strategies.
8. Keep your business busy.
9. Having marketing approval.
10. Get advantages of the chances.
11. Have a good relationship with your customers [37].

These steps can be following for any kind of successful business. They are the magic keys. However, the successful marketer who keep trying to find a good solution to make the communication easier for the customer and consider all the issues and have it soother [38].

3.2.5 FACTOR4: TECHNOLOGY

The technology makes the relationship between the marketer and the customer much closer and informal. For business improvement and service implementation, there is some information needs to be provided by the customer [39]. The customer feedback is very important information to rate the business [40, 41]. Using the social networks technology, the feedback can be provided fast or direct from the user.

For example, the feedback of both the seller and buyer can be a better way of indication on some sites such as: amazon and eBay. **"The most notable is that of the feedback rating where the parties to the transaction may rate each other [42]"** Hence, eBay subtracts the undesirable feedback amount from the positive feedback amount for evaluation [43]. Even if the buyer comments more than once, they will be counted as one feedback for that seller.

However, in our idea the student's feedback can be getting direct from the user's comments and interaction on the provided page. So, the admire user of the service would deal with the instructor again and will have more participation than the user who do not like the service or not interested in. Also, feedback can benefit in the business improvement by the user's new or discovered requirements. By that, it will be easy for us to edit any undesired service or provide any new desired service.

3.2.6 FACTOR5: MARKETING TARGET

In marketing, the target always is the customer [44]. The marketers should find the satisfied solution for the target. In fact the target of marketing includes different segmentation based on the strategy [44, 45]. You clearly distinguish your target potential beneficiaries of your business's services [46]. Your business section should explain who are your customers and how can you make their need satisfy with your provided service. **"An important aspect of marketing practice is the targeting of consumer segments for differential promotional activity. [47]"**

However, our target for the suggested business is the university or the students.

So, the business section can be formed as:

1. The business can be between the marketer "instructor" and the student. So, the student submits his/her assignment for getting service for specific amount of money. This will be direct relationship; there is no third party.
2. Second, the business can involve the marketer and the university. So, this business can be done under the university's support for reasonable price in order to run out this business under the university name.

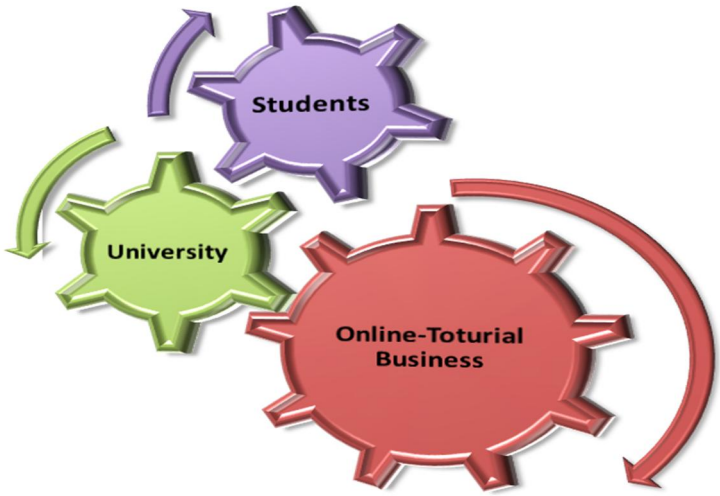

Fig. 2. Students – University – Online-Tutorial Business

4 THE IMPORTANCE

The main point of this research is all about providing learning, teaching and high level of education "online tutorial" using social network sites. This experience gives us a chance of looking up for understanding and solving an important issue for graduate students at university of Bridgeport. Providing online tutorial on Facebook site for those students can keep them in their classes and raise their grads. There are some students get bored in a traditional education way, so online tutorial can solve this issue. Other students leave their classes just because they do not get help from somewhere. So, this solution would be perfect.

Providing expensive services for a reasonable price to the students can help both the customers and marketers; especially if the marketer will only offer the time for providing this service. This solution can help the students reduce their expenses in paying a lot of money for services office who provide like this service. Online tutorial can provide more than teaching or education help service, which is the discussion class for offering some suggestions and ideas to the student.

5 CONCLUSION

The most important invention of science uprisings is the online business using the social networks sites. This becomes very popular and much convenient. Online Business using the social network motivates many researches to know and explore new ideas.

In this research, we explained our idea of creating an online business using social network sites "Facebook". This idea was based on need of specific and important service that is required by the students in the universities which is "Online Tutorial". Hence, this service will be provided for reasonable price.

Our research could clearly show how it is easy to take advantage of these free pages and make an online business with no effort or money. However, in the past years the online business could prove that, its growth can be as much as the digital world. Based on that, each of us can make his/her own business and make the future more optimism.

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Influence of knowledge on the innovation value chain performance in the product development process

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ABSTRACT: Recently, relevant changes have made organizational boundaries more fluid and dynamic in response to the rapid pace of knowledge diffusion, and innovation and international competition. This helps to reconsider how to succeed with innovation. Thus, innovative companies make use of their capabilities to appropriate the economic value generated from their knowledge and innovations. Therefore, the supply of innovative products is presented as a quality standard in the race for pressing demands. It is true that a new product or process can represent the end of a series of knowledge initiatives and the beginning of a process of value creation, which, under conditions imposed by various parties, can produce efficient results in the global performance of the value chain. The present paper aims to contribute to the planning guidelines in the innovation value chain field. Therefore, it addresses the influence of the stakeholders' knowledge on the performance of innovation value chain in product development processes applied to technology-based companies. Thus, a survey was developed with experts chosen by their technical-scientific criteria and knowledge on the subject. The data were extracted by means of a judgment matrix. To reduce subjectivity in the results, the following methods were used: Law of Categorical Judgment - psychometric scaling and the Compromise Programming - multi-criteria analysis and Electre III. The data were satisfactory, validating the methodological procedures presented.

KEYWORDS: Knowledge, Innovation Value Chain, Product Development Process, High-Tech Industries.

1 INTRODUCTION

Recently, relevant changes have made organizational boundaries more fluid and dynamic in response to the rapid pace of knowledge diffusion, and innovation and international competition. This helps to reconsider how to succeed with innovation. Thus, innovative companies make use of their capabilities to appropriate the economic value generated from their knowledge and innovations. Therefore, the supply of innovative products is presented as a quality standard in the race for pressing demands.

Developing products is not a recent phenomenon, but reconstruction presents successful and unsuccessful experiences. And any attempt to encourage reconstruction and interpretation refers to, first of all, a proper analysis of the difficulties and peculiarities of the product development chain, the "opposite semantics due to the systems' diversity of features – structures, methods and organization". The reconstruction then uses a "mantle" that takes advantage of the experience accumulated by the actors in the product development process of the value chain, considering the learning process for the construction of knowledge. In any case, product development is a complex chain of events and decisions, which can break at any of the weakest link: some projects lost due to unrealistic predictions or the absence of its real role in the agenda, or other motivations that somehow followed ideas that had many missteps or a detail error.

It is true that a new product or process can represent the end of a series of knowledge initiatives and the beginning of a process of value creation, which, under conditions imposed by various parties, can produce efficient results in the global performance of the value chain. The value chain management – VCM has for quite some time presented challenges within a

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wide diversity of extremely complex events, all of which in an unsure and risky context that can affect the flux of decisions and the desired levels of performance, hence frustrating expectations for stability. It must be acknowledged that risks can be brought about from different origins and scenarios. With time, this eventually leads to changes in the configuration of the chain. Consequently, it is considered one of the main challenges of value chain management, which basically consists of creating integrated structures of decision making in an extensive universe containing multiple organizations. This requires an integrated and shared decision structure that involves key business processes, concerning efficient coordination of functional-temporal company-client [1] [2] [3] [4] [5] [6] [7] [8]. The characteristics of the value chain differ a great deal, therefore becoming the object of analysis equally differentiated.

One of the aspects that deserves to be highlighted is the occurrence of errors in the management of the value chain, which often results in a non-fulfillment of the established goals and performance. It is imposed thus that the efficiency in the planning of the value chain propitiates more efficient decisions, diminishing the improvisation and improvement of the involved team. Traditionally, the planning phase "sins" when it is elaborated without support of the knowledge that really is essential in the management of the value chain. The knowledge may represent a strategic tool, increasing the institutional capacity of the Entrepreneurs in their assignments of formulation, evaluation and execution of such projects. In this spectrum, the present paper aims to contribute to the planning guidelines in the innovation value chain field. Therefore, it addresses the influence of the stakeholders' knowledge on the performance of innovation value chain in product development processes applied to technology-based companies. Within this context, this paper is structured according to the following sections: methodology, results and analysis; the paper concludes with the final considerations.

2 METHODOLOGY: STEPS AND IMPLEMENTATION

The objective of the methodological procedures used is to achieve the intended goal and solve the research problem. This research is characterized by a combination of sequential qualitative and quantitative approaches. The data are extracted (Judgment matrix) at two stages, based on the specialized literature to identify the knowledge variables of the stakeholders. These variables will then undergo confirmation and judgment by the experts, through a survey, in technology-based companies (in Brazil). Firstly, the degree of influence of the stakeholders' (sources) knowledge on the overall performance of the innovation value chain in technology development process was investigated in technology-based companies. The support methods used were: Compromise Programming, Electre III and promethee II. And to confirm the reliability of the results produced by the LJC Psychometric Scaling Methods and Multicriteria Method.

SAMPLE AND DATA COLLECTION

This section details the elements that comprise the sample as well as the data extraction structure used in the study. Thus, the data were first extracted from the specialized literature on the subject under investigation to prepare the scalar-type data collection instrument (assessment matrix), based on Thurstone's law of Categorical Judgment psychometric scaling method. Once the construct and content were defined, the instrument was submitted to the experts' (judges) assessment in order to confirm the scale with regards to construction and content. Thus, the stakeholders (knowledge sources) from diverse backgrounds and scenarios, directly and/or indirectly involved with the technology developing process in the innovation value chain in PDT were identified.

We first identified the following stakeholders (knowledge sources): (i) research and development - R&D [9]; (ii) Customers [10]; (iii) Suppliers [11] [12]; (iv) External consultants [11]; [12]; (v) Competitors [13] ; [14]; (vi) Joint ventures [13];[14]; and (vii) universities/other public research centers [15]. After the knowledge sources survey, the stakeholders' main spectrum of activities considered in the PDP/TPD were identified. The activities identified were: I – Project Scope; II – Concept Development; III – Prototype Development; IV – Integration of Subsystems; V – Prototype Production; VI – Market introduction; VII – Post Product Launch. It should be noted that the activities presented for the case in question are for the technology development process (TPD). The results obtained are as follows: I – Invention; II – Project Scope; III – Concept Development; IV – Concept Development; V – Technology Optimization; VI – Technology Transfer.

After identifying the technology development stages, the next step was to identify the knowledge needed to converge each of the stages in the PDT stages. The results showed the following knowledge according to the PDT steps (Clark and Weelwright, 1992; Clausing, 1993; Cooper and Kleinschmidt, 1987; Reis et al, 2006; Creveling, Slutsky and Antis, 2003): (i) Strategic Planning of the company; (ii) Technology Strategy determination; (iii) technology; (iv) consumer; (v) Generation of ideas; (vi) project scope development; (vii) mapping future plans; (viii) patent survey; (vix) identifying opportunities; (x) identifying potential ideas under certain conditions through preliminary experiments; (xi) identifying necessary resources and solutions for the shortcomings identified; (xii) projection of product platforms; (xiii) creation of QFD for technology

(technology needs); (xiv) conducting available benchmarking technology; (xv) development of partner networks; (xvi) defining new technology functionalities; (xvii) identifying technology impact on the Company; (xviii) documents analysis and generation of technology concepts; (xix) selection and development of the superior technology concept; (xx) definition of commercial products and processes and possible processes; (xxi) decomposition of system functions into subfunctions; (xxii) definition of system architecture; (xxiii) definition of system architecture; (xxiv) use of mathematical models that express the ideal function of technology; (xxv) prototype development and testing; (xxvi) identification of market impact and manufacture of these possibilities; (xxvii) preparation to implement the business case; (xxviii) identification and evaluation of critical parameters; (xxix) technology optimization from its critical parameters; (xxx) analysis of factors that can result in platforms; (xxxi) development of the platform subsystems; (xxxii) carrying out optimizing experiments; (xxxiii) design of integrated subsystems platform; (xxxiv) system performance tests; and (xxxv) defining the technology selection criteria. Thus, the influence of the stakeholders' knowledge on the performance of innovation value chain in PDT under constraint and uncertainty was based on the activities and their respective technology development stages.

Taking into consideration that development projects of new technologies involve high risks and uncertainty (Cooper, 2006). To reduce the risks and uncertainties of innovative projects in this research, the analogy of [16] was applied, which proposes executing various activities throughout technology development, considering that there is an organized arrangement among them, hence enabling to better manage the process. These projects are not developed properly, influenced by the instability of technology and markets that change unexpectedly. Furthermore, these projects can be developed as part of product designs, causing conflicts when developing an innovative product [17]]18].

After this procedure, the performance dimensions of the innovation value chain in TDP were identified (based on the literature). The results showed the following dimensions: customer impact, business and sales return derived from innovations. For the case in question, the influence of knowledge on the overall performance of the innovation value chain was considered. Next, we identified the influence of knowledge according to the dimensions individually considered: customer impact, business return and sales percentage derived from innovation. Technology-based companies are organizations that structure their activities in the development and production of new products and/or processes, based on the systematic application of scientific and technological knowledge and the use of advanced and pioneering techniques. These companies have knowledge and technical-scientific information and a high rate of R&D expenditures as their main input. The main element that distinguishes this category of companies from others is the risk of activities that includes innovations. And this is because they operate in specific sectors with non-standard technologies.

The influence of knowledge on the overall global performance is detailed in the next section, using the LJC psychometric scaling method, as well as the influence of knowledge according to each performance dimension of the value chain using the Multicriteria Analysis method: Compromise Programming, Electre III and Promethee II. In summary, the results were extracted from the literature and then confirmed and validated by experts that were selected by their technical-scientific criterion on the object, with their experiences/practices and/or knowledge about product development, technological innovation and organizational management in technology-based companies in Brazil. Twelve experts were selected. The instrument was submitted to the experts via e-mail and through personal interviews. The final response rate was of 80%. More than half of the respondents were managers or supervisors, followed by senior managers (general manager or director), representing 40%. The remainder held or hold various management positions in technology innovation and product development. The results are detailed to follow.

3 RESULT AND ANALYSES

Monitoring the innovation value chain performance from a knowledge management perspective requires that the appropriate monitoring procedures are in place and operational [5] ; [8]. These procedures will of course depend on the kind of measures taken earlier and must be tailored to them. But it is not only improvement plans that must be monitored. Generally, a keen eye must be kept on the knowledge household of Value Chain Management. Especially important is watching the external environment for new events that may have impacts on the way Value Chain Management deals with knowledge shown as "incoming" arrows that will influence the execution of the knowledge management cycle.

3.1 INFLUENCE OF KNOWLEDGE ON PERFORMANCE IN VALUE CHAIN INNOVATION: THURSTONE'S LJC METHOD

As referenced earlier, the influence of knowledge on overall performance was conducted by means of the Thurstone's LJC psychometric scaling method. The method allows a scale by importance. The experts (judges) express their preferences with pairs of stimuli (knowledge), and these were submitted to the ordinal categories C1=5th place; C2=4th place; C3= 3rd; C4=2nd place; C5=1st. The procedures to apply the instrument are systematized in the following steps: Step 1: Determining the

frequencies of preferences for pairs of stimuli (Knowledge), where O_i is equal to Knowledge and O_j to the experts – $O_i]O_j$. The systemized data were extracted from the experts' preference regarding Knowledge (through field research using an assessment questionnaire/matrix). Knowledge appears as stimuli submitted to the ordinal categories. Step 2: Determination of the frequencies of ordinal categories, based on the data extracted from the previous step. The matrix [πij] of the cumulative relative frequencies is then calculated. The results are classified in ascending order of importance. To better understand the technique, we recommend the following literature [19] [20]. Step 3: To determine the matrix [πij] of the cumulative relative frequencies from the results of the frequencies of ordinal categories we calculate the matrix of the cumulative relative frequencies. Step 4: To determine the inverse of the standard normal cumulative frequencies (INPFA), from the results obtained in the previous step, calculate the inverse of the standard normal cumulative frequencies. The results reflect the experts' preference probabilities in relation to stimuli (knowledge). . The results are detailed to follow.

Table 1. Probability Intensity of Knowledge Influence on Performance in the Innovation value chain

Knowledge (Stimulis)	C1	C2	C3	C4	($\mu i = -\sum_{j=1}^{4} \boldsymbol{Zij}$ /4), TOTAL	Ranking
R&D	-1,22	-1,22	-1,22	-0,76	-4,43	**1º**
External consultants	-1,22	-1,22	-0,14	1,22	-1,36	**7º**
Suppliers	-1,22	-1,22	-0,76	1,22	-1,99	**5º**
Joint ventures	-1,22	-1,22	-0,43	1,22	-1,65	**6º**
Competitors	-1,22	-1,22	-1,22	0,43	-3,23	**3º**
Clients	-1,22	-1,22	-1,22	-0,13	-3,8	**2º**
Universities/ research center	-1,22	-1,22	-0,76	0,43	-2,78	**4º**

The application of Thurstone's LJC method, of mental decision, resulted in the preferences obtained ($\mu i = -\sum_{j=1}^{4} \boldsymbol{Zij}$ /4), in order of increasing priority. The order found was: first the R&D knowledge and in second place the knowledge generated from Customers. Investment policies have been strongly oriented to R&D. R&D has become a strategic development leverage for companies seeking to achieve world class status [21]. The presence of R&D creates an organizational setting that is favorable to questioning, promoting corporate/company flexibility, with an ability to integrate new concepts and adaptability to market changes [22]. In addition, the knowledge and past experience gained with R&D, as well as their lasting and not sporadic existence, renders it instrumental to innovation [23]. Studies on R&D efficiency have many applications as a management tool. R&D is strong performance measure, similar to ROI. It can also be used as a means of comparison (benchmark). R&D efficiency is also an aggregate measure of the overall success of a company's product in the development effort. R&D brings the percentage of researchers employed; success rate of R&D products; patent number and R&D intensity; the decision for innovation capacity informs the degree of innovative R&D ideas; the collaboration intensity with other companies or R&D centers; R&D sharing capacity; forecast and evaluation of innovative technology initiatives for business innovation.

Within this outlook, it is possible that R&D is the central component of firms' technological innovation activities. It is believed that the organizational efficiency in these activities that lead to innovation enables the firms to achieve the satisfactory and desired performance, traditionally measured by sales growth, net income growth and return on investment. R&D and innovation are susceptible to sectorial influences [...] [24]. Product innovation is considered stronger in high-technology sectors [...] [25]. Moreover, the central element is the internal role of R&D to maximize the benefits of innovation from other forms of knowledge [26] . It should be noted that companies with a strong customer focus are able to anticipate the needs of current and latent customers [27]. [28] state that customer-focused companies focus on Product innovation versus process innovation and continuously collect information on the needs of competitors and target customers, and check their ability to use this information to create superior customer value. A company's strong customer-focus can lead to an emphasis on innovation that is derived from the desire to continually adapt to customer needs [29]. [30] calls attention to the fact that client knowledge enables the companies' regrouping and creation of incremental value. And within this perspective, [31] show that companies should take every opportunity to interact with customers in order to enrich their customer knowledge base. Consequently, a company can gain a thorough understanding of its customers, thus better able to meet their demands.

3.2 INFLUENCE OF KNOWLEDGE ON THE PERFORMANCE OF INNOVATION VALUE CHAIN: MULTICRITERIA METHOD

To execute this step the multicriteria method was used: Compromise Programming, Electre III and Promethe II. The multicriteria method was chosen due to its flexibility for the case in question, especially the subjective nature of the variables involved and the problem to be solved. The methods' application anticipates weight inferences to the evaluation criteria, expressing their relative importance. The relationship of significance between the evaluation criteria should reflect the stakeholders' resulting values within the study's scope of application, considering their specific expectations for each criterion. In this spectrum, defining the criteria weights is characterized as a group decision-making problem, which includes identifying the stakeholders' preferences and consensus.

The definition of the evaluation criteria weights used in this work proposal was prepared by the experts, through a judgment matrix. With the judgment matrix results, these methods were applied: Promethee II, Electre III and Compromise Programming, to evaluate the stakeholders' knowledge influence on the value chain performance considering each of the performance dimensions. Thus, these are the stakeholders identified: (i) R&D; (ii) Clients; (iii) Suppliers; (iv) External consultants; (v) Competitors; (vi) Joint ventures; and (vii) universities/other public research centers, which here are considered as the independent variables. The performance dimensions: customer impact and business return, were considered as dependent variables. The results showed the following classification:

Table 2. Performance of the stakeholders' knowledge on the innovation value chain performance: Compromise Programming, Electre III and Promethe II

Stakeholders' knowledge (Sources)	Ranking		
	Promethee II	Compromise Programming	Electre III
R&D	1°	1°	1°
Clients	1°	1°	3°
Suppliers	3°	3°	2°
External consultants	4°	4°	2°
Competitors	2°	2°	3°
Joint ventures	4°	4°	4°
Universities/other public research center	2°	2°	3°

Both methods (Compromise Programming and Promethee II) indicate R&D Knowledge and Customers as the most relevant to ensure performance of the innovation value chain in PDT.

When comparing the results in terms of performance, the methods Compromise Programinng and Promethee II did not differ in their classifications. As for Electre III, the results were divergent. This is due to the veto threshold p, q and v, respectively, of indifference, strong preference and veto or incomparability, moreover, there is a discrepancy in the structure of its results (classification). Electre III features a solution group with a more flexible hierarchical structure. This calls attention to the method conception itself, as well as the quite explicit consideration of indifference and incomparability between alternatives. As an advantage of this structure of results, an easier consideration of the most difficult aspects to address and an analysis can be concluded, enabling a final less rigid hierarchy, around a small group of alternatives that can also be classified as better options.

The alternatives that exhibited some measures of incomparability were classified as other alternatives, which did not feature the same characteristics, and which were placed in a situation of disadvantage, regarding other criteria. It is observed that such alternatives are not comparable with any other alternative. Similar to the incomparability feature, another important characteristic of the methods Electre III and Promethee II is intransitivity. Considering that Compromise Programming is based on the distance of the alternative evaluated as an "ideal solution" vector, it is then concluded that this method has transitive features. Thus, the methods that better performed to ensure performance of the innovation value chain in PDT are: Compromise Programming and Promethee II, which resulted in the following classification in decreasing order: (^{1st}) R&D customers; (^{2nd}) Competitors and Universities/Research Centers; (^{3rd}) Suppliers; and (^{4th}) External Consultants and Joint ventures. The results referenced by the methods "Promethee II" and "Compromise Programming" reflect the preference, in the experts view, by R&D knowledge and Customers, with 68% and 59% of the preferences, respectively. Within this perspective, the multicriteria methods are viable instruments to measure the performance of the innovation capacity dimensions for the performance of high-tech companies. The results produced by this prioritization

enable managers to better focus their efforts and resources on managing the capacities that perform best, which results in achieving the goals sought by the companies.

4 FINAL WORDS: LESSONS LEARNED

The objective of this study was to contribute to the planning guidelines in the innovation value chain field. Therefore, it addresses the influence of the stakeholders' knowledge on the performance of innovation value chain in product development processes applied to technology-based companies. The study strived to fill a gap in the existing literature on the value chain performance from the perspective of knowledge in the product development process. Thus, a set of psychometric scaling methods, multicriteria analysis was conceived. This procedure enables to reduce the subjectivity in the results achieved. The compelling presupposition assumed is acknowledging the importance of subjectivity in the decision-makers' judgment; their values, their goals, their biases, their culture, their intuition, as well as the influence of subjective factors on the perception and understanding of the variables involved.

Decision-making processes play an important role in product innovation processes. In every stage of the process decisions are made about the progress of the project [32]. The high demand for innovative products has been treated as a challenge for the adoption of traditional project management (PM) practices and methods, specially those ones developed in turbulent and complex business environments. Product development process (PDP) has received special attention from companies due to it is recognized as a source of competitive profits. Continued innovation of products, services, technology and the organization itself, has been one way to keep a business on its feet during the turbulent 1990s [33].

Through its systematization companies can reduce theirs costs and development time and increase their product quality. The dream scenario for thousands of businesses would be to gain the ability to get their products to market faster, and to know with some certainty that their product-development projects would be completed on schedule. Thus, The present work intends to contribute to the innovative planning guidelines in the field of product development. The knowledge may represent a strategic tool, increasing the institutional capacity of organisations and the Entrepreneurs in their assignments of formulation, evaluation and execution of such projects. The knowledge would work as a facilitator instrument of improvement, contributing for the quality of services and the enhancement of the agility to decide.

Within this spectrum, this paper investigated the influence of the stakeholders' knowledge on the performance of the innovation value chain in product development process applied to technology-based companies. Several conclusions can be drawn from the results of this research. It is essential to measure the contribution of knowledge in the value chain performance. The performance of the value chain is an interdisciplinary and multidimensional concept that considers several areas of knowledge. The sample data supported the conceptual model derived from the literature. The confirmation of the general model proposed was important because it empirically evidenced that knowledge from R&D sources is considered the greatest influence on the performance of innovation value chain. Even if it is simply the probability intensity of the influence of this knowledge on the PDT innovation value chain.

The results obtained have been satisfactory, validating the proceeding proposed for assembling and prioritizing critical knowledge for research and development (R&D), as well as for comprising other elements of performance in the innovation value chain. Thus, this paper is aimed at an important area in Brazil. The current challenge is to develop knowledge systems to collect, distribute and disseminate information/knowledge to enable and facilitate policy development for the early implementation of innovation projects in product development. In this scenario, our methodological contribution is highlighted, because it provides support to the critical priorities in order to implement this project, and is also directed to building up knowledge as a key element for product development.

We look forward to a more practical and efficient orientation that supports its long-term goals, thus assuring national competitiveness concerning the category of priorities. By gathering the cognitive elements, it can be seen that this strategy requires a priority dynamics, which depends on the initial state of product development process, on the concrete characteristics of the projects and on an innovation policy and cognitive problems that emerge during practice, always placing in view new contents. For this, priority research must be permanently and recurrently applied. Moreover, it is important that this method be used in other applications. Also, it is recommended testing the hypothesis by giving the decisions environment of that category of projects an intelligent treatment, by means of this research's systematic knowledge, which makes decisions more efficient concerning the development and management of product development projects.

Few studies have investigated the influence of knowledge on PDP under constraint conditions. It is hoped that this study will stimulate a broad debate on the issue and it is acknowledged that more studies are needed to build more robust results in the near future. In addition, the study is limited to technology-based companies, opening the possibility for significant

results. Moreover, the measurement of qualitative variables is a highly subjective factor. All data were collected transversally, and therefore what can be concluded is that the variables and their effects are related to a single point in time, thereby showing a limiting factor.

Finally, there may errors deriving from various origins such as incomplete sampling bases, among others. Some key priorities are proposed for future studies. We acknowledge the importance of replicating this study and repeating this testing model approach, using a completely new sample from other sectors. Interesting comparisons could also be carried out, as for instance applying the procedure adopted here in another country, in order to compare the results. Within this spectrum, this methodology does not claim to be complete, but it is our intent to make it a generator of strategic elements for the development of innovation projects. This is where the knowledge Management becomes important, since it is a key instrument for project development in such a complex issue, as it is the case of product development.

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Simulation of thermocline thermal energy storage system using C

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ABSTRACT: Solar thermal power generation is a modern technology, which has already shown feasible results in the production of electricity. Thermal energy storage (TES) is a crucial element in solar energy applications, which includes the increase of building thermal capacity, solar water heating systems for domestic use, and Concentrated Solar Thermal power plants for electricity generation. Economic, efficient and reliable thermal energy storage systems are a key need of solar thermal power plants, in order to smooth out the insolation changes during intermittent cloudy weather condition or during night period, to allow the operation. To address this goal, based on the parabolic trough power plants, sensible heat storage system with operation temperature between 300°C – 390°C can be used. The goal of this research is to design TES which can produce 1MWe. In this work simulation is performed to analyze the Liquid medium STES using C. In this case different liquid medium TESs is investigated and out of all mixed-media single-tank thermocline TES is selected and designed based on the Schumann equation. In particular, this equation is numerically solved, in order to determine energy storage, at different locations and time inside the storage tank. Finally, due to their feasibility, low cost of manufacturing and maintenance are designed and sized to the minimum possible volume.

KEYWORDS: Sensible thermal Energy storage, single tank, thermocline, modeling, minimum volume.

1 INTRODUCTION

Thermal energy storage (TES) is a critical element in solar energy applications, including in the increase of building thermal capacity, solar water heating systems for domestic use, and Solar Thermal power plants for electricity generation. In order to meet the changes in solar radiation and peak demands a fully functional storage system may be required in a solar thermal power plant. The usage of relatively cheap storage system is the major advantage of solar thermal power plant compared with other power plants. For continuous operation of the plant the thermal energy storage system is used which store energy and can smooth out the plant operation during intermittent cloudy weather conditions also. Therefore, thermal storage plays an important role with the key technologies on economics of energy for the future success of solar thermal technology.

Molten-salt thermocline TES for solar thermal power plants can: (1) offer power plants the potential to continuously deliver electricity without fossil-fuel backup; (2) meet peak demand independent of weather conditions; (3) increase the storage temperature above 450^{o}C to raise the Rankine cycle efficiency above 40% ; and (4) save 35% of cost compared to a two-tank storage system. In a molten-salt thermocline, a molten salt (e.g., Hitec or Hitec XL) is used as the heat transfer fluid (HTF) that transports the thermal energy between the storage unit and the other sections of the power system such as the collector field and the steam generator. Separation between the hot and cold zones of the molten salt is naturally ensured by buoyancy forces; stable thermal stratification is thus maintained in the fluid in a single tank.

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1.1 SINGLE-TANK THERMOCLINE SYSTEM

In a single-tank or thermocline system, hot and cold fluids are stored in the same tank. This system provides one possibility for reducing the cost of storage tanks. Here the hot and cold fluids are separated because of the stratification, and the zone between the hot and cold fluids is called the thermocline as shown in Fig. 1.

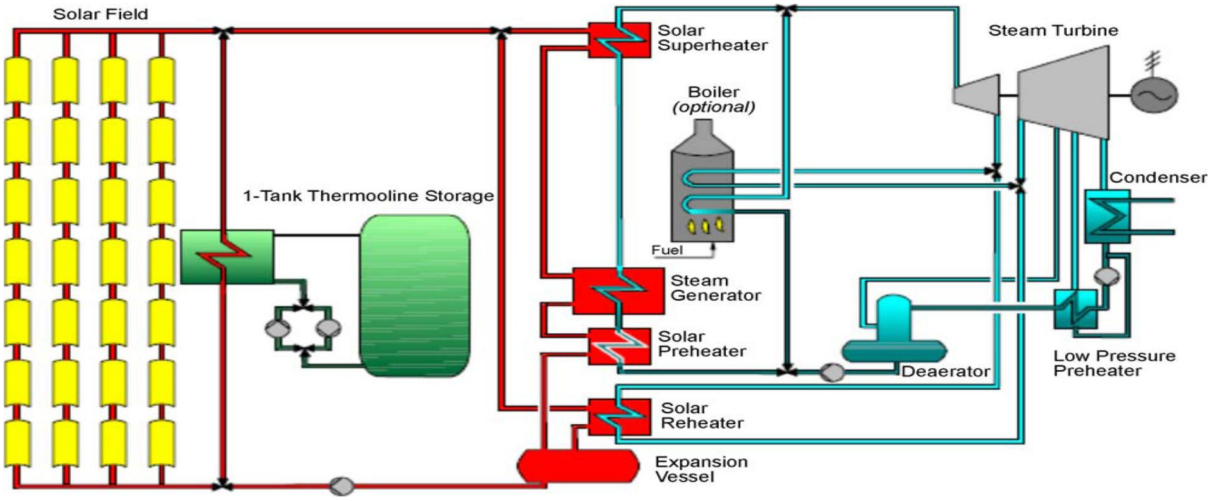

Fig. 1. Single-tank indirect thermocline thermal energy storage [1]

1.1.1 CONVENTIONAL SINGLE-TANK THERMOCLINE SYSTEM

The final reduction in storage tank volume is achieved when the storage tank volume equals the storage fluid volume. As shown in Fig. 2, the storage tank is filled with cold fluid at the beginning of the operation. The thermal energy is made available in the form of hot collector fluid and then from the bottom of the storage tank the cold fluid is withdrawn and heated. Then the storage tank is filled with the hot storage fluid again. By doing it properly, the less dense hot storage fluid will "float" on top of the cold storage fluid, creating what is termed a *thermocline*. However, about 10% of height in the storage tank contains mixture of the cold and hot medium. This phenomenon actually occurs quite commonly in many fluid systems ranging from the ocean to residential hot-water heaters.

Conventional single tank systems, due to their thermal stratifications are less desirable and maintaining stratification is much simpler in solid media. But this thermal stratification behaviour can be decreased by designing a new concept of mixed-media single tank thermocline system.

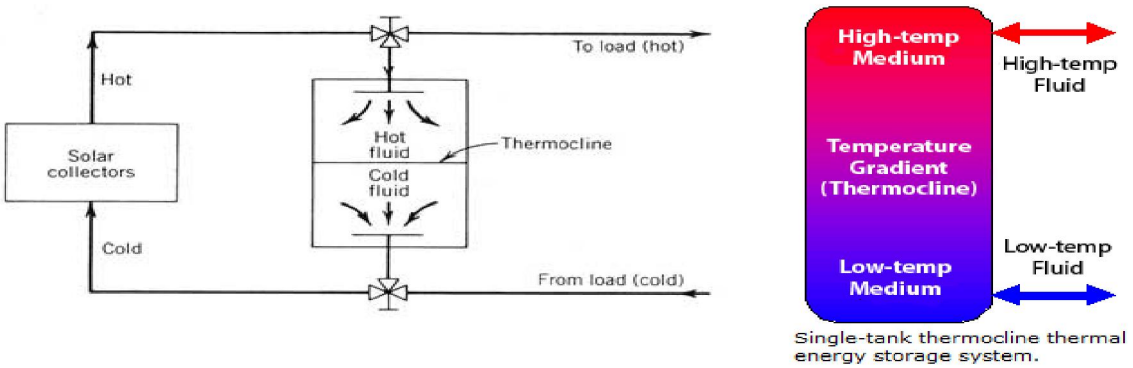

Fig. 2. Thermocline thermal energy storage

1.1.2 MIXED-MEDIA SINGLE TANK THERMOCLINE SYSTEM

Once the tank volume has been reduced to a minimum through the use of single tank thermocline system, the next step in reducing the capital cost of the storage system is to reduce the cost of the storage fluid as shown in Fig. 3. Organic heat-transfer oils are typically used in high-temperature solar energy systems to avoid the cost of high-pressure plumbing systems. Unfortunately, most organic heat-transfer oils are expensive. Mixed-media thermocline storage systems seek to displace expensive heat-transfer oil inventory in storage with less expensive materials such as rock and sand.

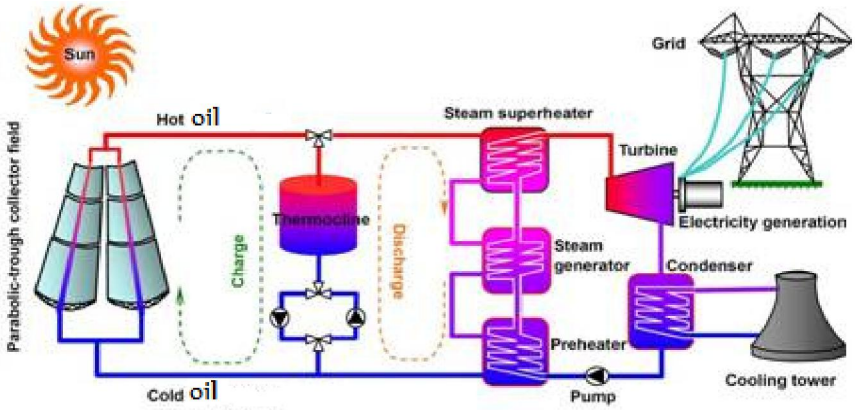

Fig. 3. Mixed-media single tank thermocline system

Advantages of the single tank thermocline system are: [1]

- Decrease of storage tanks cost.
- Low cost of the filler materials (rocks and sand).
- Thermocline system is about 35% cheaper than the two-tank storage system.

The disadvantages are:

- It is more difficult to separate the hot and cold HTF.
- Maintaining the thermal stratification requires a controlled charging and discharging procedure, and appropriate methods or devices to avoid mixing.
- Design of storage system inlet and outlet is complex.

2 TES ANALYSIS USING MIXED-MEDIA SINGLE TANK THERMOCLINE SYSTEM

The solid medium chosen for this project work is nominally 2.54 cm (1 in.) diameter gravel plus sand. Two sizes are used in the storage tank to obtain the void fraction of about 0.25-0.30. Thus, this concept reduces the quantity of oil used in the conventional thermocline storage by about 75%. Top and bottom manifolds are employed to distribute the heat transfer oil across the cross section of the tank.

The assumptions generally made for methemaical analysis, as shown of heat transfer in a thermocline storage system are the following:

- One dimensional heat flow.
- The fluid flow is one dimensional.
- The bed is assume uniformly packed having the same apparent density and the same uniform apparent thermal capacity throughout.
- The temperature gradient in the radial direction are assumed neglegible.
- No mass transfer.
- Thermal gradients within solid particles are neglected.
- Heat loss to the enviroment neglected.
- Internal heat generation is absent.

The main objective of this design is to obtain a solution for temperature of the rocks (solid) and the fluid as a function of time and distance along the bed. The design procedure is to make a transient heat balance for rocks as well as the fluid.

In order to describe the thermal and geometric properties of the storage as shown in the above Fig. 4 a number of parameters are involved; typically these are particle size, void fraction, storage cross sectional area and storage length, superficial fluid velosity and the Reynolds number.

The porosity or void fraction, ε, is given as:

$$\varepsilon = \frac{void\ volume}{Total\ volume} \tag{1}$$

Volumetric heat transfer coeffiecient:

$$h_v = a * h \tag{2}$$

where *a* is surface area of rocks per unit volume, *h* is the heat transfer coefficient per unit surface area rock.

Superficial mass velocity (mass flux) is:

$$G = \frac{4\dot{m}}{\pi D^2} \tag{3}$$

The energy balance for the fluid element can be written as:

$$\rho\varepsilon A * dx * C_p \frac{\partial T}{\partial t} dt + GA * C_p \frac{\partial T}{\partial x} dx.dt + h_v A * dx\left(T_f - T_s\right)dt + U_L \pi D * dx\left(T_f - T_0\right)dt = 0 \tag{4}$$

where, the first term represents the change in the energy stored in the fluid, the second term the energy carried away (convected away) by the fluid, the third term the energy supplied by fluid to the solid, and the last term the heat loss from the walls to the surroundings.

Then dividing by *Adx* and neglecting heat loss to the surrounding

$$\rho\varepsilon * c_p \frac{\partial T_f}{\partial t} dt + GC_p \frac{\partial T_f}{\partial x} dt + h_v\left(T_f - T_s\right)dt = 0 \tag{5}$$

And again dividing by $\rho\varepsilon C_p$

$$\frac{\partial T_f}{\partial t} + \frac{G}{\rho\varepsilon}\frac{\partial T_f}{\partial x} + \frac{h_v}{\rho\varepsilon C_p}\left(T_f - T_s\right) = 0 \tag{6}$$

Similar heat balance for the solid particles yields

$$\rho_s(1-\varepsilon)c_{ps}\frac{\partial T_s}{\partial t} = h_v(T_f - T_s) \tag{7}$$

Here, the term on the left side accounts for heat capacity of solid (sensible heat storage), and the right hand side accounts heat gain from fluid.

$$\frac{\partial T_s}{\partial t} = \frac{h_v}{\rho_s(1-\varepsilon)c_{ps}}(T_f - T_s) \tag{8}$$

By introducing non-dimensional variables to replaces *x* and *t*:

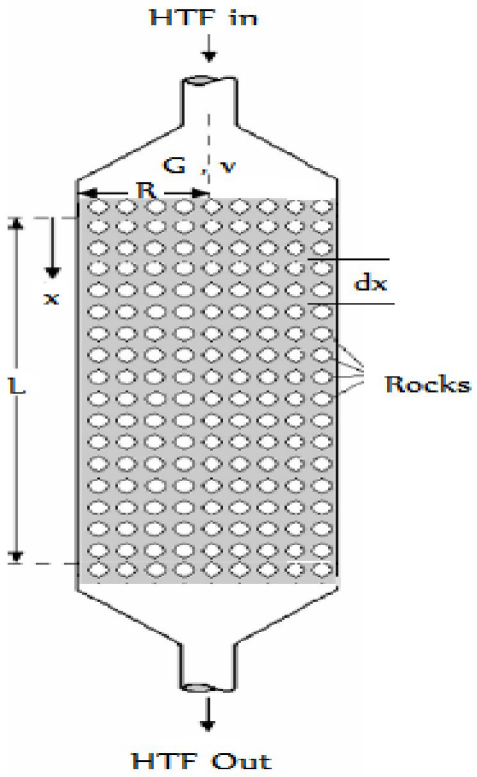

Fig. 4. Model of mixed media thermocline thermal energy storage

$$\tau = \frac{h_v t}{\rho_s C_{ps}(1-\varepsilon)} \qquad And \qquad X = \frac{\pi D^2 h_v x}{4\dot{m} C_{pf}} \tag{9}$$

Equations 6 & 7 are solved by Schumann [4] to obtain a non-dimensional temperature distribution. The solution, as a function of non-dimensional X (axial distance) and τ (time), are given by:

$$\frac{T_s}{T_{fi}} = 1 - e^{-(X+\tau)} \sum_{n=0}^{\infty} X^n \sum_{k=0}^{\infty} \frac{(X\tau)^k}{k!(k+n)!} \tag{10}$$

And

$$\frac{T_f}{T_{fi}} = 1 - e^{-(X+\tau)} \sum_{n=1}^{\infty} X^n \sum_{k=0}^{\infty} \frac{(X\tau)^k}{k!(k+n)!} \tag{11}$$

The result of the terms on right hand side of equation 10 & 11 are listed on the Appendix chart result.

The energy stored in the storage material at any instant of time is given by [3]:

$$= \int_0^L \left[(1-\varepsilon)\rho_s C_{ps}(T_s - T_i) + (\varepsilon \rho_f C_{pf}(T_f - T_i)\right] \frac{\pi}{4} D^2 dx \tag{12}$$

To determine the temperature distribution within the storage Equations 10 and 11, are solved using. For the results, refer Appendix Chart results.

2.1 CALCULATING VOLUME OF THE STORAGE A NUMERICAL SIMULATION PROCEDURE

For this purpose it is assumed that:

- Initially the storage is filled with HTF and sold(Rock) at ambinte temperature of 27^0C.
- Inlet temperature of the HTF is 300^0C.
- Mass flow rate is 0.5kg/s.
- Void fraction is 0.28.

Property of the HTF

In the case of the mixed-media thermocline system installed at Barstow, CA, extensive testing of fluid stability in the presence of the hot rocks was performed. The storage fluid chosen was a commercial organic heat-transfer fluid, Caloria HT-43®. This fluid was found to be stable over long periods when in contact with rock of temperatures up to 300°C.

Caloria HT 43, is liquid under atmospheric pressure below temperature of 315^0C. Its operation temperature was between 218^0 – 302^0C. It is marketed by, ExxonMobil Lubricants & Specialties.

To produce a saturated steam at T=250^0C for continues 1 hour at a mass flow rate of the steam at 2.88 kg/s , the energy required is 27.75GJ.

$$Q_s = \rho V C_p \Delta T \tag{13}$$

$$= (\rho V C_p \Delta T)_s + (\rho V C_p \Delta T)_f$$

$$27.75 * 10^9 J = (2245(V)800 * 273)_s + (800(V)2100 * 273)_f$$

$$227.5 = 4.903 V_s + 4.586 V_f$$

Table 1. Property of Caloria oil and solid rock

Property	Caloria HT43 @ 300^0C [7]	Quartzite and silica sand [4]
Density	800 kg/m^3	2245 kg/m^3
Specific heat capacity	2100 J/(kg.k)	800 J/(kg.k)
Viscosity	5.0*10^{-6} m^2/s	
Thermal conductivity	0.13 w/(m.k)	0.13 w/(m.k)

Since the economics of thermocline system are a stronger function of the void fraction, design was done to determine the highest packing density of quartzite and silica sand, based on the experiment done on reference [2], void fraction of 0.28 is taken.

$$\varepsilon = \frac{V_f}{V_f + V_s} \tag{14}$$

$$0.28 V_s = 0.72 V_f$$

Therefore: $V_f = 16.14 m^3$

$V_s = 41.5 m^3$

Total volume of the storage is: $V_T = 57.64 m^3$

Number of pieces of rocks, based on reference, average diameter of rock is 2.45cm.

$$V_{rock} = \frac{4}{3}\pi * r^3 \tag{15}$$

$$= 8.58 * 10^{-6} m^3$$

$$N0. of\ pieces\ of\ rocks\ are = 4{,}836{,}690$$

Therefore, if the total volume is divided into six equal parts, size of a single storage is

L = 3.06 m and R = 1 m

2.2 PRESSURE LOSS

The pressure loss across a mixed single-tank thermocline storage unit is also is important since large volumes of fluid are being handled. Chandra and Willits [6] have suggested the correlation:

$$\Delta P = \frac{LG^2}{\rho_f d}\varepsilon^{-2.6}\left[1.7 + \frac{185}{R_e}\right] \quad (16)$$

Assuming mass flow rate of 0.5 kg/s

Then $$G = \frac{4\dot{m}}{\pi D^2}$$

= 0.159 kg/(s.m^2)

And $$R_e = \frac{Gd}{\mu_f} \quad (17)$$

= 807.72 laminar flow

Therefore the pressure drop is 201 N/m^2 on single thermocline storage.

3 RESULTS OF THE TEMPERATURE DISTRIBUTION ON A SINGLE THERMOCLINE THERMAL ENERGY STORAGE

These results are collected based on the value on Appendix Chart result, which are obtained from the compiler after computing Eq. 6 & 7 using C programming. Moreover, all assumptions assumed previously considered here.

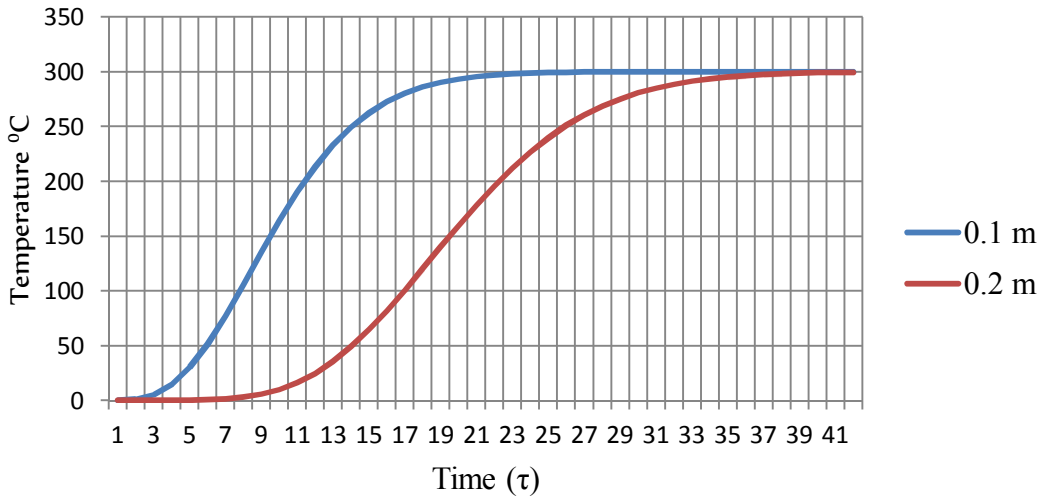

Fig. 5. Temperature distributions on the HTF (oil) at different positions

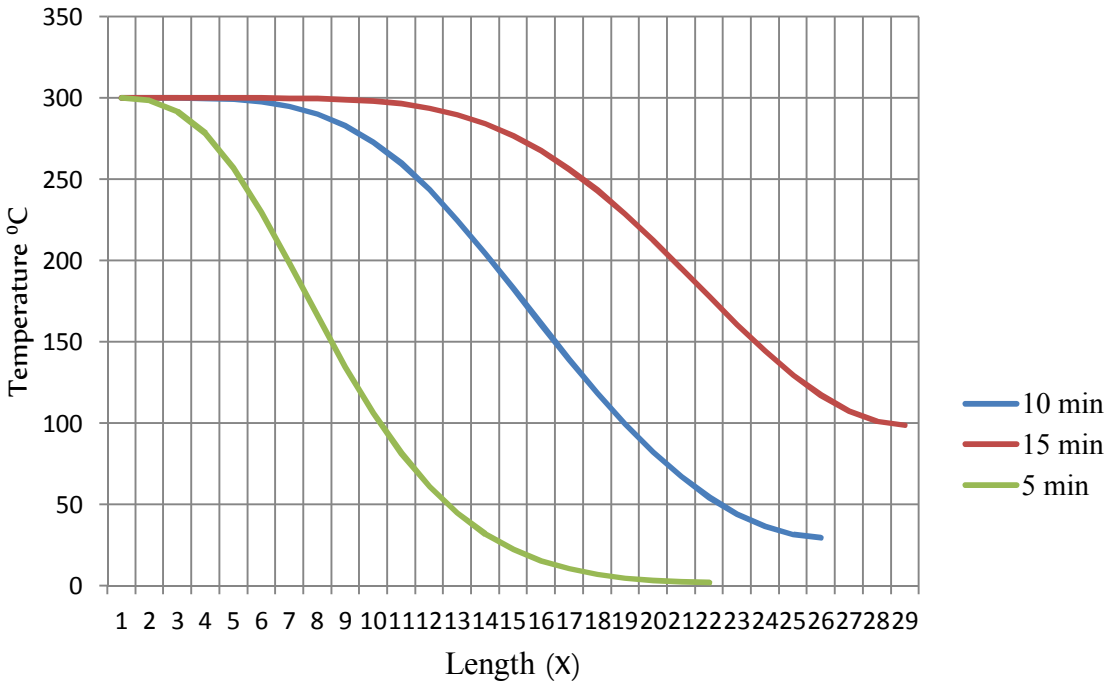

Fig. 6. Temperature distributions on the HTF (oil) in different times

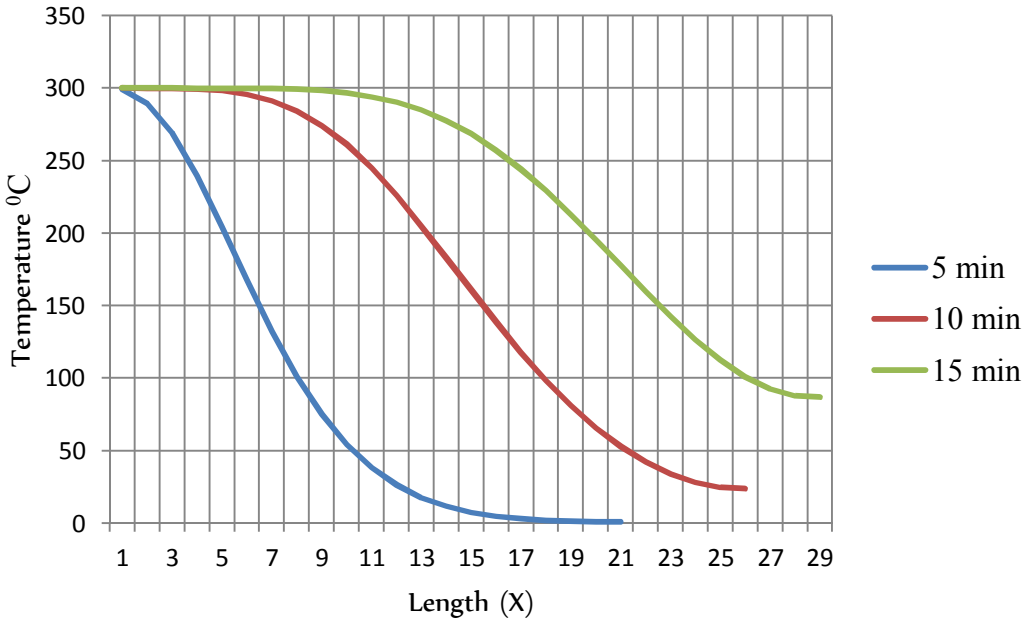

Fig. 7. Temperature distributions on the solid rocks at different times

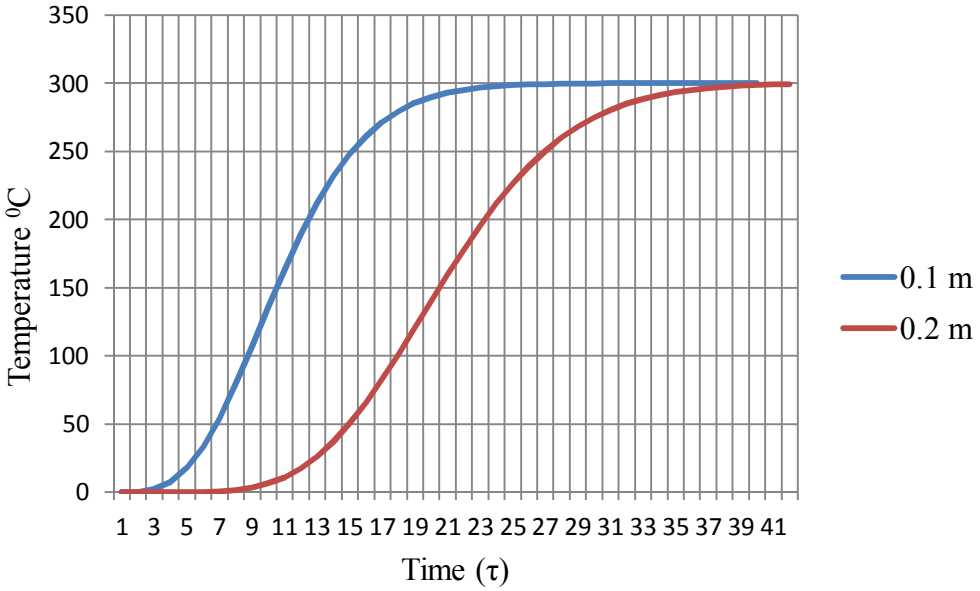

Fig. 8. Temperature distributions on the solid rocks at different positions

This temperature vs. time or distance distribution graph Fig. 5, 6, 7 and 8 show temperature decreasing in the direction of flow. Since the hot fluid is supplied from the top, the top part of the storage is higher in temperature than the bottom until temperature equilibrium occurs in the storage.

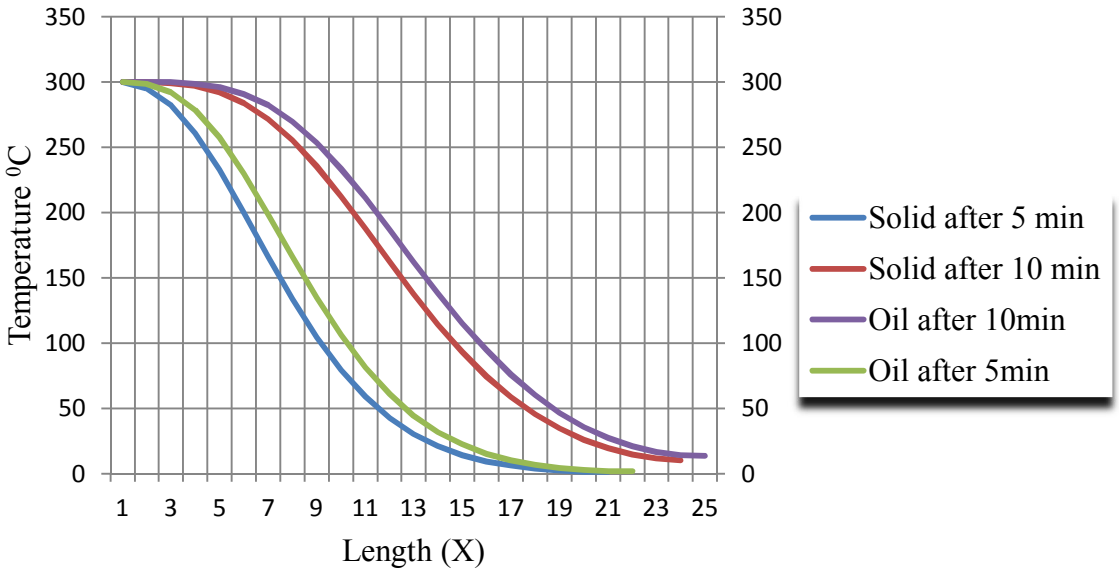

Fig. 9. Temperature distributions on the storage in different times

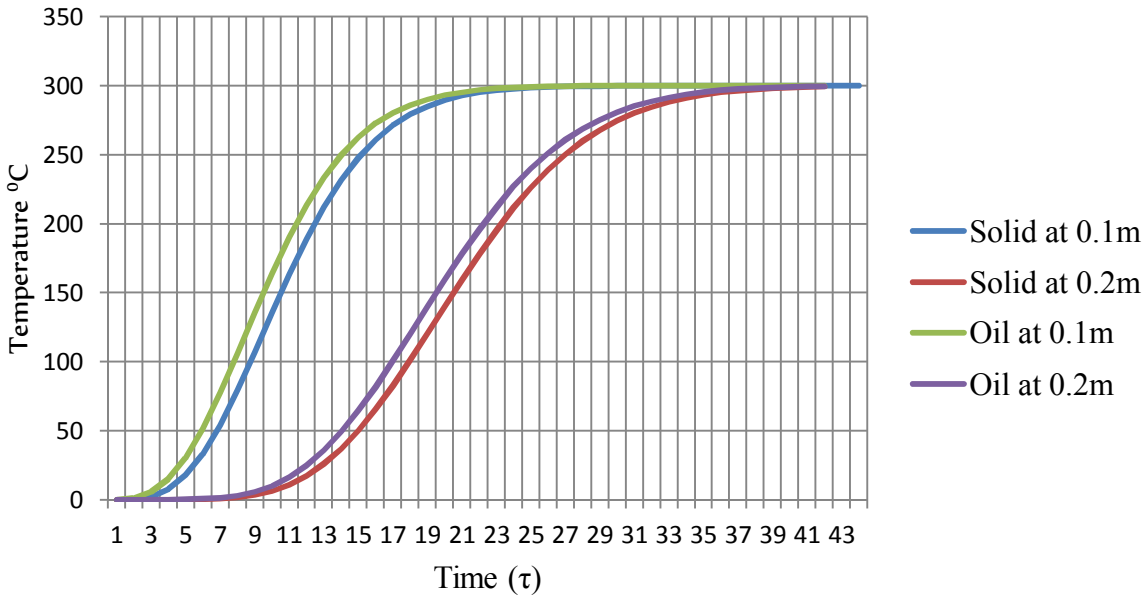

Fig. 10. Temperature distributions on the storage at different positions

Figures 9 & 10 show that, temperature of the HTF is greater than the solid rock at any position inside the storage except at the top and bottom that is temperature assumed to be equal.

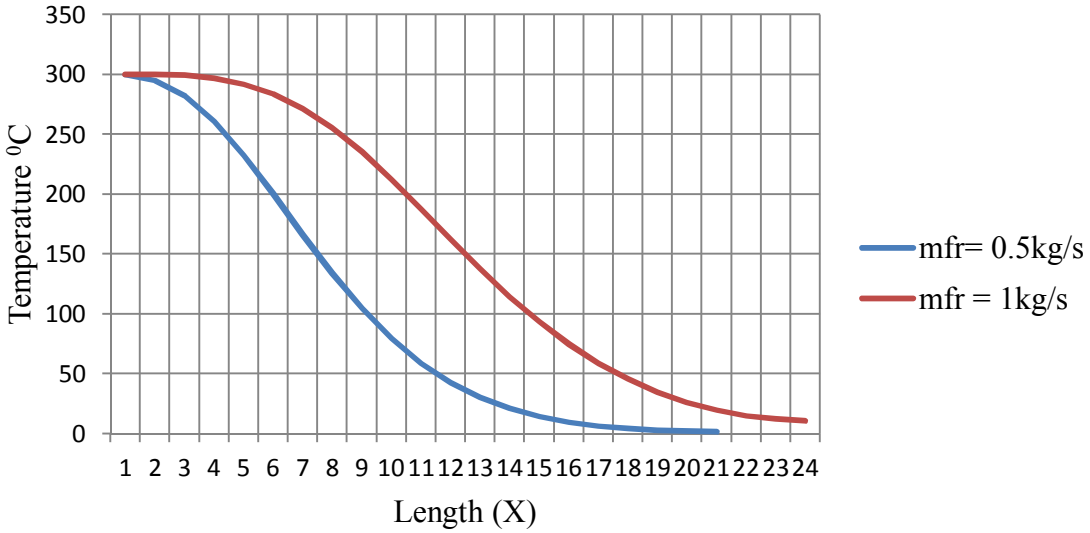

Fig. 11. Temperature distributions on the solid rocks as the mass flow rate changes

Figure 11 shows temperature distribution on the storage for which the mass flow rate is increased from 0.5kg/s to 1kg/s. The temperature of the storage also increases or in other words it will be charged faster.

4 CONCLUSION

Simulation of thermocline thermal energy storage system is performed using "C" and with careful design of the tank inlet and outlet diffusers, mixing of the hot and cold fluids can be minimized, leading to a rather small transition region between the hot and cold fluid regions. Understanding of particular property of the hot storage fluid and its stability in the presence of hot solid rock in any potential for the catalytic degradation of the fluid. Careful consideration must be paid to the tank design to prevent tank rupture due to stresses. As the tank heats up, its internal volume increases and the solid media settles. When the tank cools, stress builds up at the bottom of the tank as the solid media is compressed.

Based on the literature surveys on different liquid media TESs to select the most optimum, feasible-design TES and by comparing in all these manufacturing cost, design and HTF cost Mixed- media single-tank thermocline system seems cheapest. Total volume of the storage is $V_T = 57.64m^3$. Number of pieces of rocks based on reference [5], average diameter of rock is 2.45cm. $N0.of\ pieces\ of\ rocks\ are = 4{,}836{,}690$. Therefore, if the total volume is divided into six equal parts, size of a single storage is L = 3.06m and R = 1m

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An Experiment on Horizontal and Vertical Wind Turbines with Incorporation of Rounded Shroud Device Using Wind Simulation in a Vehicle

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ABSTRACT: The detrimental impact on the environment over the utilization of the conventional energy based fossil fuel is obvious. Thus, the effort on the reduction on the dependency on this unclean fuel is salient. The application of the clean renewable wind power can be one of the appropriate measures in supporting the effort in reducing the dependency on the unclean fuel. Performance is one of the essential aspects in determining the economic attractiveness on the technology application. One of the factors responsible to the performance of the power technology is the wind velocity acting on the rotor blade. The addition of a shroud element is believed to have a great promise to increase the velocity at rotor, thus possibly improving the performance of the wind turbine. This study presents an experiment on horizontal and vertical wind turbines incorporated with rounded shroud devices. The experiment is conducted in a vehicle to simulate the effect of the flow of wind. The results on this experiment indicate that the addition of the shroud device with geometry of diffuser improves the performance of the horizontal axis wind turbine. For the nozzle shroud geometry, it seems to less significantly improve the performance of the horizontal axis wind turbine. For the vertical turbine, the incorporation of the shroud devices, both nozzle and diffuser, has almost no effect to increase the performance. This study also presents the discussion for the reasons behind the experimental results by relating to the condition of the turbine rotation and the wind velocity inside the shroud devices.

KEYWORDS: Wind turbine, shroud, performance, experiment, vehicle.

1 INTRODUCTION

Energy plays an essential role in the social and economic development. It is inevitably that currently the major sources of energy worldwide come from fossil fuel. Relying merely on the energy based fossil to support the social and economic development seems to be less appropriate option as the limitation and, importantly the detrimental environmental impact of the greenhouse gas carbon emission.

The application of the clean renewable wind power can be one of the appropriate options in reducing the dependency on this exhaustible and unclean fuel. The wind technology has been developed rapidly and are about to play an important role in a new energy field [1]. All wind turbines installed by the end of 2010 worldwide can generate 430 TWH per annum, which is equal to more than 2 percent of the global electricity consumption [2].

There are two main classes of wind turbines; horizontal and vertical axis turbines. Each of which has advantages and disadvantages. The horizontal turbines offer higher efficiency, easier starting, less torque fluctuation and higher speed rotation than the vertical machines [3-4]. The vertical turbines offer some beneficial features including no requirement for a constant yaw mechanism in the local wind direction, less noise than the horizontal turbine due to low rotational operation, lower manufacturing cost for a very large vertical turbine than that of the equivalent horizontal turbine due to the simpler

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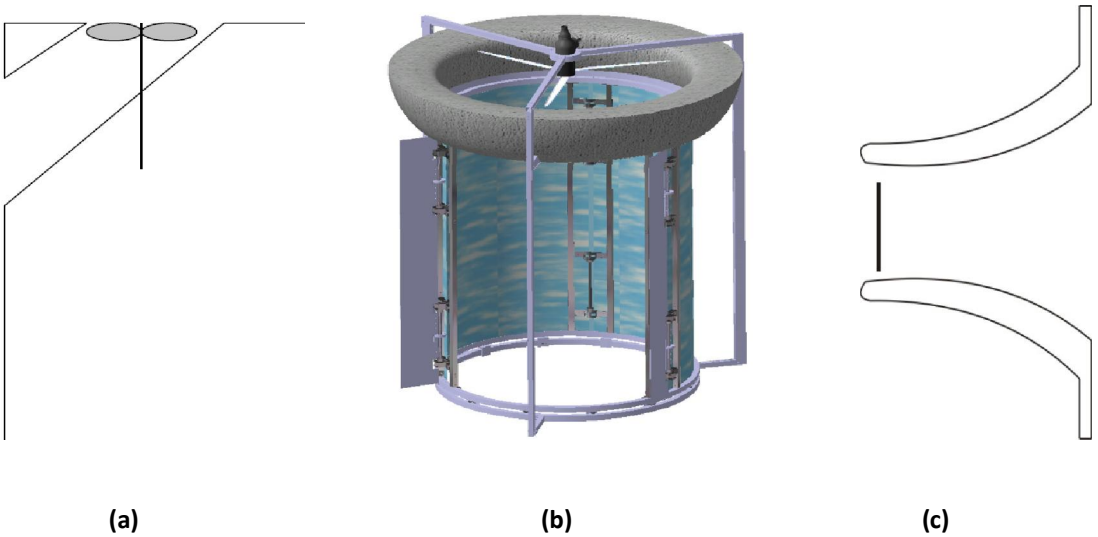
straight constant section blades and mechanically better able to withstand higher winds through changing stalling behavior and better operational safety during gust conditions than those of the horizontal turbine [5].

Performance is one of the essential aspects in the design phase of the wind technology. This is because that the aspect can determine the economic feasibility on the wind technology application. The high performance possibly makes the wind technology posing economical senses when it is put into application, while the low performance effortlessly brings the technology less favorable for application. The performance of the wind technology can be determined by the dimension of the turbine and the wind velocity [6]. The bigger a wind rotor, the more wind energy is obtained. The more wind speed, the more force acting on the rotor, making the higher torque generated as well as the higher performance. The idea of increasing the wind speed becomes the main scope in this study.

It seems to be impossible to create the nature of windy condition. However, by, one of the alternative methods, incorporating a shroud device into the wind machine, it seems to be highly possible to create a local environment where the wind speed can be higher than the ambient velocity, thus it can enhance the wind machine performance.



(a) **(b)** **(c)**

Fig. 1 (a) The shrouded wind turbine in a building section
(b) The bucket shape wind turbine (c) The diffuser shroud wind turbine

A reference [7] shows an investigation on a placement of a shrouded wind turbine in a building section [Figure 1a]. The idea of this configuration is to harnesses the pressure difference of the air flow between the front facade and the roof of the building in order to increase the velocity. Using a wind tunnel test and a *Computational Fluid Dynamic* (CFD) simulation, it is shown the wind velocity through the shroud can increase by the factor around 1.5.

A reference [8] shows a study on an improvement of a wind machine performance by incorporating a shroud with the geometry of a bucket-shape which is partially hollowed on its cylindrical surface [Figure 1b].The configuration of the bucket shroud is to guide the airflow into the inlet (the hollowed surface) and across the outlet (the other hollow) simultaneously so that a low-pressure zone develops alongside the outlet to create a suction effect which accelerates the airflow inside the shroud. Using a *Computational Fluid Dynamic* (CFD) analysis and a field experiment, it is found that the wind speed inside the shroud can increase by the factor almost two.

A grounded shrouded wind turbine is studied in [9]. The idea of the grounded shroud turbine is that the rotor and the supporting electrical equipment may just as well be positioned on the ground (or even underground). The configuration also enables the structure to be much easier to be built, assembled and maintained. Using a one-dimensional momentum analysis, it is indicated that the coefficient of performance (CP) can possibly exceed the Betz limits (the maximum efficiency of the bare turbine) when the pressure difference along the shroud is high.

Turbines incorporated with a flanged diffuser shroud are investigated in [1,10,11] using a wind tunnel analysis, a *Computational Fluid Dynamic* (CFD) analysis and a field experiment [Figure 1c]. It is shown that the wind speed in the diffuser

can be higher than the ambient wind speed. The addition of the diffuser generates a low-pressure zone in the region behind the turbine, thus it can absorb more wind from the outside, as a results it increases the wind speed inside the shroud [1].

A reference [12] shows an experiment on the effect of adding a rounded diffuser on the performance on models of three–bladed horizontal axis wind turbines. The effect of the wind flow is simulated by a standing-fan. The results of this experiment show the addition of the diffuser improves the rotation and the torque of the turbine shaft.

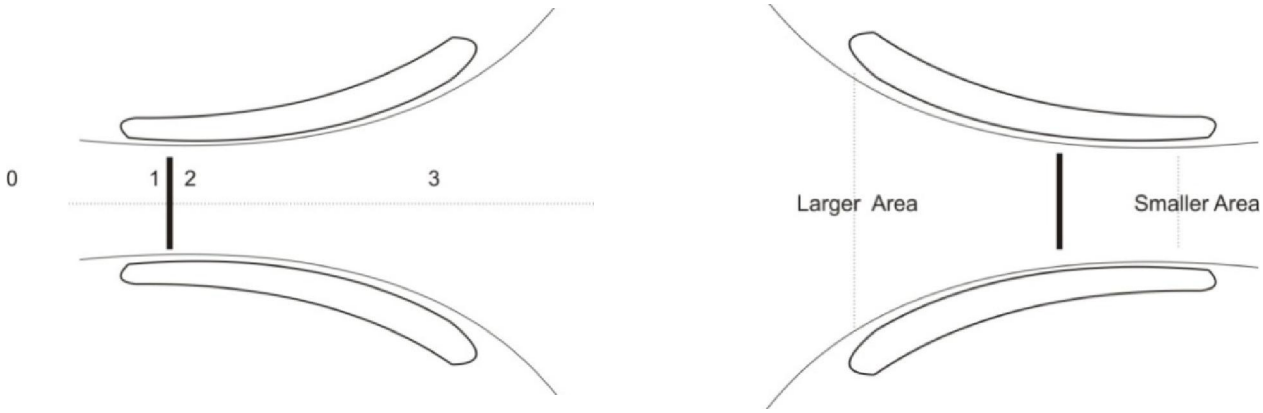


Fig. 2 (a) Model of diffuser shroud wind turbine (b) Nozzle shroud wind turbine

A one-dimensional mathematical model to analyze the turbine with the incorporation of diffuser shroud is developed in [13]. The Bernoulli equation is applied to develop the model. The induced velocity (V_1) (m/s) derived from the model is formulated by

$$V_1 = V_0\sqrt{\frac{\eta_{01} - C_{pb}}{\eta_{01}+K-C_{P23}}} \quad (1)$$

where, V_0 is the free-stream velocity (ambient velocity) (m/s), C_{pb} is the base pressure coefficient, defined as

$$C_{pb} = \frac{P_3-P_0}{\frac{1}{2}\rho {V_0}^2} \quad (2)$$

P_0 is the static pressure at the free-stream region (ambient pressure) (N/m^2) and P_3 is the static pressure at the rear part of diffuser (N/m^2).

Parameter of K is the resistance coefficient defined as

$$K = \frac{P_1-P_2}{\frac{1}{2}\rho {V_1}^2} \quad (3)$$

where P_1 is the static pressure in region immediately before the turbine (N/m^2) and P_2 is the static pressure in region immediately after the turbine (N/m^2).

Parameter of C_{P23} is the diffuser coefficient formulated by

$$C_{P23} = \frac{P_3-P_2}{\frac{1}{2}\rho {V_1}^2} = \left(1 - \left(\frac{V_3}{V_1}\right)^2\right) \quad (4)$$

where V_3 is the velocity at the rear region (downstream) (m/s).

Parameter of η_{01} is the inlet diffusion efficiency, formulated by

$$\eta_{01} = \frac{(P_1-P_0)}{\frac{1}{2}\rho {V_0}^2 - \frac{1}{2}\rho {V_1}^2} \quad (5)$$

From the model, one of the approaches to make the velocity enhancement ($V_1 > V_0$) is that the base pressure (C_{pb}) should be negative. This means that the static pressure at the rear region of the shroud (P_3) must be lower than the ambient pressure (P_0) (see Equation 2). Another option to obtain the velocity enhancement is to make the high amount of the diffuser coefficient (C_{P23}). This can be obtained when the velocity at the rear region of the diffuser (V_3) is lower than the induced velocity (V_1) (see Equation 4). The shape of the diffuser can contribute to make the velocity at the rear (V_3) lower than the induced velocity (V_1). This is because that the area of the diffuser at the rear is higher than the area where the induced velocity is generated (at inlet). Based on the continuity law, when fluid passes into a higher cross sectional area, the velocity reduces. The low resistance coefficient (K) also enables the velocity enhancement (see equation 1).

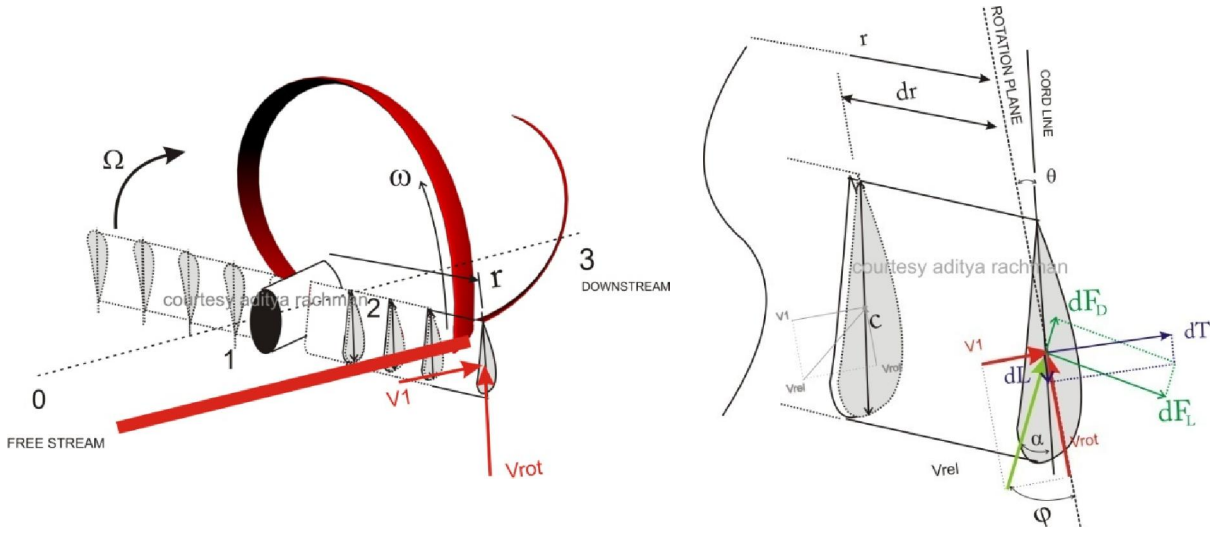
Instead of the studies on the shroud geometry, there is a study [14] on the shrouded wind turbine considering the effect of blade number. A *Computational Fluid Dynamic* (CFD) analysis is employed in this study. The result of this study shows that the high blade number into a shrouded diffuser wind turbine can result in the reduction of the mass flow rate to reduce the performance.

From previous references, the addition of the shroud devices shows a potential to improve the wind velocity. The diffuser shrouded arrangement seems to be favorably utilized in some of the references. Theoretically, nozzle, which is geometrically opposite to diffuser, can also potentially enhance the velocity. This is because that nozzle has the shape of the lower cross sectional area at the rear part which can make the increasing on the wind velocity (see Figure 2 (b)). The aim of this study is to present an experiment on the horizontal and vertical axis wind turbines incorporated with shroud devices of nozzle and diffuser in order to increase the performance. The methodology of generating this study is a simulation on models of the wind turbines incorporated with the shroud devices in a vehicle in order to provide the effect of wind flow.

2 METODOLOGY

2.1 MODEL OF TURBINE

The model of the horizontal turbine is designed with three blades with the radius of 0.30 m. The blade shape is a plate with the width at hub of 0.05 m and the width at tip of 0.13 m.



(a) **(b)**

Fig. 3. (a) The model of Blade Element Momentum (b) The detail of the forces on a blade element Illustrated by Rachman, adopted from [6 and 15]

To obtain an optimum design of the blade pitch angle, this study conducts a parametric study using the Blade Element Momentum (BEM) model. According to [16], this model can be utilized in designing the wind turbine blade and in evaluating the wind turbine performance. The formula to find the power (P) in the BEM model is

$$P = \int_{rh}^{R_T} \frac{TL\, 8\, \Omega\, B\, c\, \rho\, V_0^2}{(\sin\varphi)^2 (K+4)^2} (C_L \sin\varphi - C_D \cos\varphi)\, r\, dr \quad (6)$$

where, TL is the tip loss factor, V_o is the ambient wind velocity (m/s), B is the blade number, ρ is the specific mass of air (kg/m^3), c is the cord length (m), Ω is the blade rotational speed (RPM), r is the elemental radius (m), dr is the elemental length (m), R_T is the turbine radius (m) and rh is the hub radius (m). Parameter of φ is the wind relative angle following the relation of $\varphi = \alpha + \theta$, where θ is the blade pitch angle and α is the attack angle. Parameter of C_L is the lift coefficient and C_D is the drag coefficient of the blade cross sectional shape. In this model, the input velocity (V_0) is 17 m/s. The computer program of MATLAB is employed in the calculation using the BEM model. The result of this parametric study shows that at the pitch angle of 20 °, the power will be a maximum. Thus in the horizontal turbine model, the pitch angle is set to be 20°.

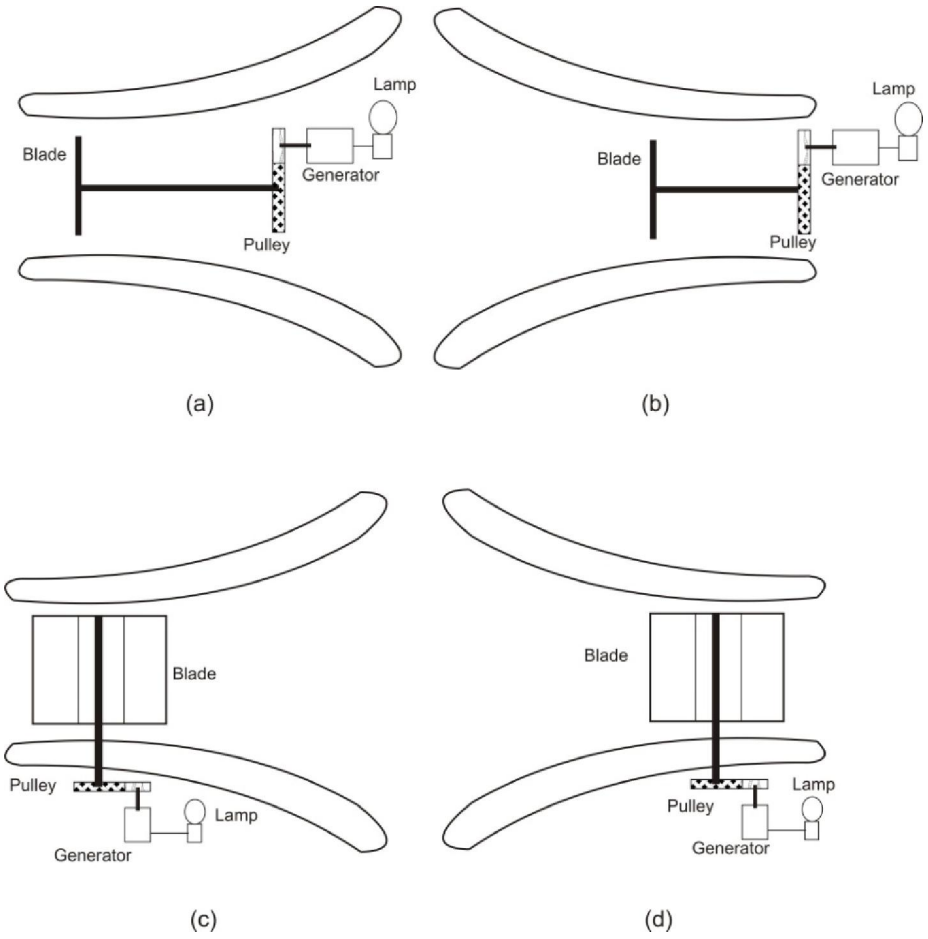


Fig. 4. Models of the wind turbine (a) Horizontal turbine with diffuser (b) Horizontal turbine with nozzle (c) Vertical turbine with diffuser (d) Vertical turbine with nozzle

The model of the vertical turbine is designed with three blades with the height of 0.6 m. The blade shape is a *S-Rotor* (Savonius Type) with the width of 0.15 m. Both models (horizontal and vertical turbines) are designed as such they can be modified for the placement of a rounded shroud device with the geometry of diffuser and nozzle. The shroud has the ratio of the smaller diameter to the length of 0.33 with the incline angle of 4 ° [adopted from a study [1]). The shaft of the turbines is connected to a pulley which is linked into a generator where lamps are connected.

2.2 EXPERIMENT METHOD

The models are placed in the rear part of a van. The vehicle is moved and the velocity in the opposite direction becomes the wind operating velocity for the turbines. The wind speed is measured by an anemometer. In this experiment, the operating wind speed is set to be 10 m/s. For each model tested, it measures the electricity current in the lamps in order to obtain the coefficient of performance (CP), a ratio of the energy generated by the wind turbine to the available wind energy, formulated by

$$CP = \frac{R\,[I]^2}{0.5\,\rho\,[V_0]^2\,A} \quad (7)$$

where I is the measured electricity current in the lamps (Ampere), A is the turbine swept area (m^2) and R is the resistance of the lamps (ohm).

Fig. 5. The method of experiment

To provide the explanations on the experimental results, the data of the turbine blade rotation and the wind speed inside the shroud when the turbine is omitted will be measured by tachometer and anemometer respectively.

3 RESULTS AND DISCUSSION

The results indicate that the horizontal axis wind turbine with the diffuser has the highest coefficient of performance (CP) (around 0.4), the horizontal turbine incorporated with the nozzle has CP of 0.26, and the horizontal turbine without the diffuser and the nozzle (bare) has CP of 0.20 (see Figure 6). The horizontal turbine with the diffuser has the rotation of 808 RPM, the horizontal turbine using nozzle has the rotation of 620 RPM and the bare horizontal turbine has the rotation of 560 RPM (Figure 7). For the vertical turbines, the coefficient of performance (CP) is almost similar in all arrangements (CP around 0.1) (Figure 6). The vertical turbine with the diffuser has the rotation of 400 RPM, the vertical turbine with the nozzle has the rotation of 390 RPM and the bare vertical turbine has the rotation of 398 RPM (Figure 7).

The turbine performance, theoretically, is the function of torque and rotation. Thus, the high rotation possibly results in the high performance. This could be one of the reasons for the highest performance of the horizontal turbine with the diffuser as the rotation is the highest among the turbines tested. The high rotation of this turbine can be caused by the high wind speed inside the shroud (Figure 8).

For the horizontal turbine with the nozzle configuration, although the wind speed inside the shroud is higher than the ambient velocity, the rotation is not significantly different to that of the bare turbine. This may be due to the losses on the contribution of the wind velocity in the tip region (near the inner shroud surface). The airflow in the middle would be at a high speed. However, in the region near the inner surface of the nozzle, it will be very low due to the air friction (see Figure 9). As the contribution of the velocity at the tip is less, the turbine rotation is not too high; as a result the torque generated would be not too high, thus the performance will be not significantly improved.

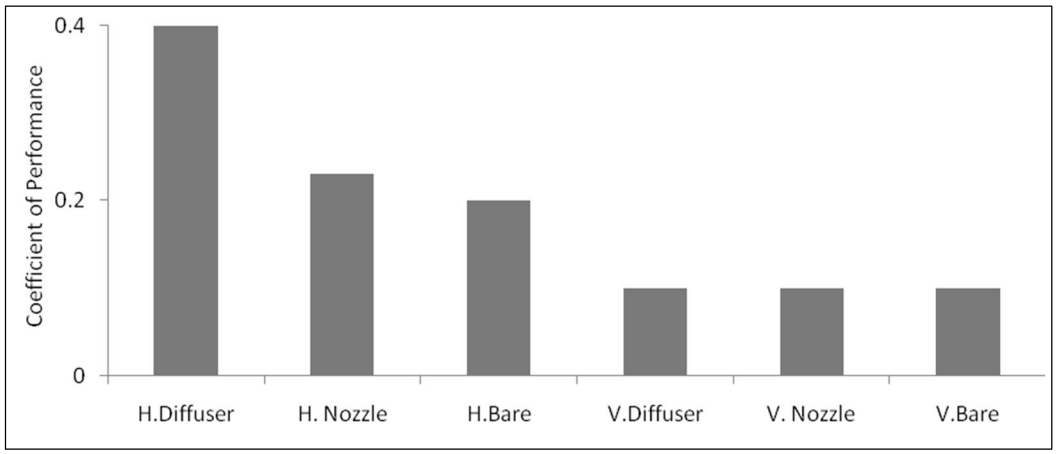


Fig. 6. The Coefficient of performance in the wind models tested

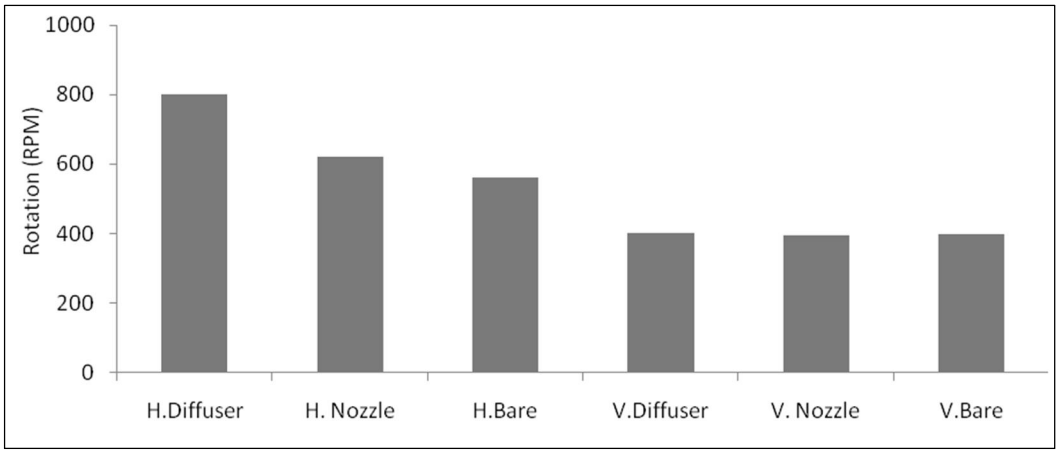


Fig. 7. The rotation in the wind models tested

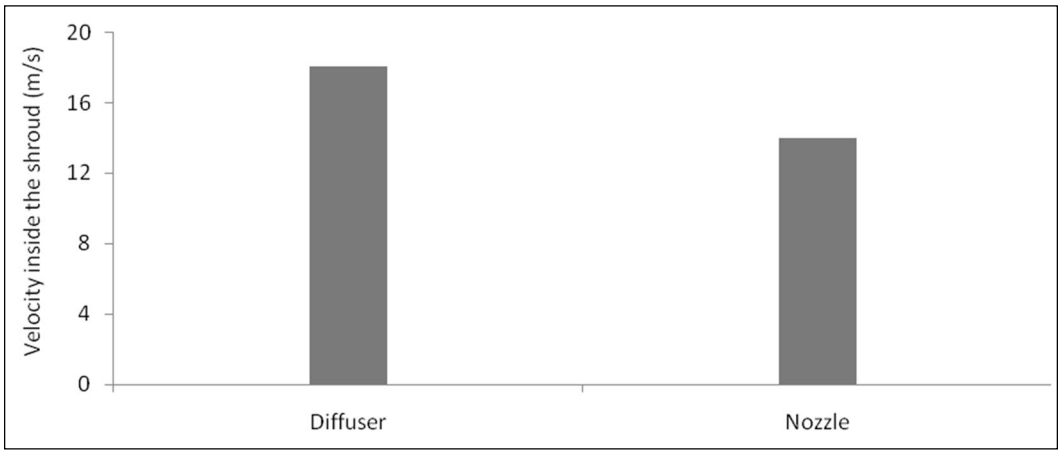


Fig. 8. The velocity inside shroud (omission of turbines)

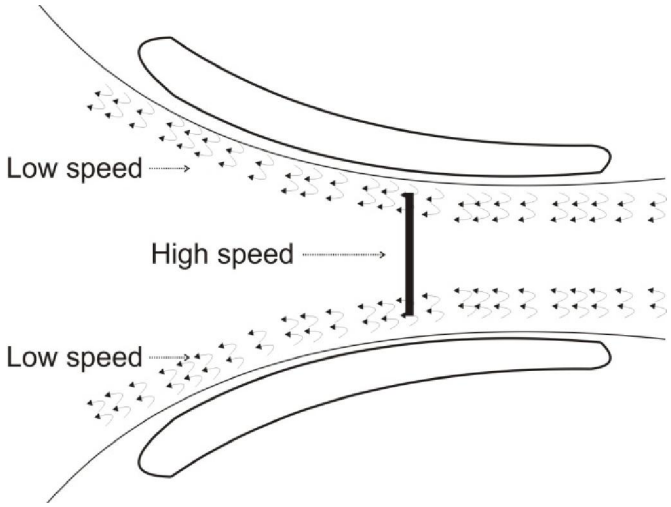


Fig. 9. Velocity profile inside the nozzle

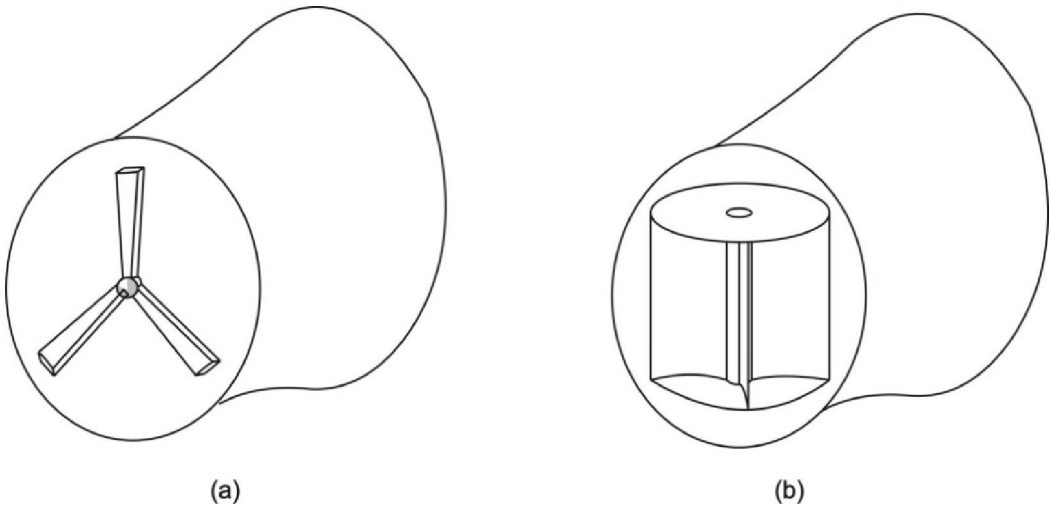


Fig. 10. The condition of the blade area facing the approaching wind in the shroud device
(a) The horizontal turbine (less blade area) (b) The vertical turbine (more blade area)

For the vertical turbine, the addition of the shroud devices almost has no impact on the change on the rotation and the performance. For the diffuser shrouded arrangement, the resistance aspect can be one of the factors responsible. As the vertical turbine has more blade area compared to the horizontal turbine (see Figure 10), it creates more blockage effect, reducing the wind flow into the turbine. This condition can be explained by using the mathematical model for the turbine with the diffuser in section I. The resistance coefficient (K) can represent the existence of the turbine. This is because that the turbine can act as a porous disk which allows only some air faction to pass. This condition makes the pressure difference of the region immediately before the turbine and the region immediately after the turbine (P_1-P_2). When a turbine has more blade area, the pressure difference can be high; as a result the resistance coefficient is high, thus the induced velocity will be low (see equation 1). As a vertical turbine has the higher blade area (60 cm x 30 cm x 2) compared to the horizontal turbine (the maximum of 13 cm x 30 cm x 3), the resistance coefficient for the vertical turbine will be higher.

For the vertical turbine with the nozzle shrouded arrangement, both the resistance effect of the blade area and the air resistance inside the shroud can contribute for the almost zero impact on the power enhancement.

4 CONCLUSION

This study presents the experiment on the models of the horizontal and vertical wind turbines equipped with the shroud devices with the geometry of nozzle and diffuser in order to increase the performance. Following paragraph is conclusions that can be drawn.

The addition of the diffuser on the horizontal axis turbine model seems to be effective to enhance the performance. The effect of the wind velocity enhancement inside the shroud can be one of the factors responsible for the increase in the performance. The addition of the nozzle seems to have less effective to enhance the performance of the horizontal axis turbine. For the vertical turbine, the incorporation of the shroud devices almost has no contribution to enhance the performance. The blockade effect created by the high blade area of the vertical turbine can be one of the factors responsible for this phenomenon.

In further study, for the vertical arrangement case, it is very important to choose the turbine with less blade area in order to gain the high induced velocity. The selection of the Daerius type–vertical turbine can be one of the potential alternative options as the blade area facing the approaching wind in this vertical type turbine is typically low.

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Managing Real-time Collaboration in Validated Content Management System

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ABSTRACT: Content Management Systems (CMS) provide to its users the ability to publish on the Web with no need to have experience in developing web pages, this way CMS also participates in the expansion of reducing quality of content placed on the web similarly to Web 2.0 tools. The mechanism of validating content indicates a high level of quality content control while putting users as main players according to Web 2.0 standards, from this prospects we develop Validated Content Management System VCMS as a new Web 2.0 tool that supports content validation mechanism.
The VCMS system requires collaboration between users when content is being static validated. Real-time synchronization between users during collaboration on the same project can make this process easier and brings more rapidity to content publication while maintaining the mechanisms that allows quality control in our system.
In this article we present the technic of implementing real time interaction between users during collaboration on the same content. We focus on promoting the What You See Is What You Get (WYSIWYG) editor to support Real-time collaboration between multiple content generators. . The approach presented in this paper can be integrated to any collaborative Content Management System and also can be used in all collaborative applications that generate Web content such as blogs or wikis offering to these tools the feature of collaborating on the same content between multiple users in real-time.

KEYWORDS: Web 2.0, real-time, Content Management System, web content, WYSIWYG.

1 INTRODUCTION

Web 2.0 has created tools for users to produce and publish their content easily and simply [1], therefore the problem of lack of quality and information overload is still expanding [2].

While Web 2.0 has created an evolution on the web by facilitating publishing, we have many resulting limitations [3]. There are limitations to users:

- A limited number of participants.
- Low participation rate.
- Heterogeneous participants.
- The motivation of participants.
- There are also limitations related to the produced information:
- Low quality of information.
- Expanding the amount of information.
- Lack of security and copyright.
- Lack of semantics.

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We focus our researches in improving content quality on the web 2.0 by controlling published content using its tools, in this way we build content validation theory based on implementing users in evaluating content and using a relevant user's measurement. The validation of Web content is used to classify the information published by relevance and filter publications by quality [4].

We consider Content Management systems as a new field for applying our content validation theory at the point where they make easy creating content on the web. Our team is building a new generation of Content Management Systems where content is controlled. During our analysis of different CMSs we found that they don't offer possibility to collaborate on the same content in real time while the workflow mechanism we made in our approach needs this technic. This article explains how we implement it in our Validated Content Management system.

In the first part we present the concept of validation of the content and its principles, subsequently we introduce content management systems and its architecture. Finally we present our Validated Content Management System and implementation of real time collaboration.

2 VALIDATION OF THE CONTENT ON THE PARTICIPATORY WEB

Content production on the Web was not subject to quality and relevance control. The approach proposed by our team introduced a new model of validation and monitoring of the quality of content along its life on the web [5]. It focuses on classifying both information and user:

- Information: the content is classified into categories that represent a range of quality. The organization facilitates the classification of content according to the relevance of the information.
- Internet users: users are classified into groups with certain privileges and responsibilities. We cite the producers (content production), the validators (content validation) and experts (supervision of validation).
- Content produced in the context of validated content involves two processes: static validation and dynamic validation.
- Static Validation: achieved by the validation committee (experts and validators). This is to assess the quality of content by two validators assigned by an expert. If the quality is unsatisfactory, the content will be rejected. Otherwise it will be published with an initial quality.
- Dynamic validation: this part is performed by users themselves. Everyone has the right to evaluate the content with a note that reflects its quality. The lifetime of this content is controlled by varying its note dynamically.

3 CONTENT MANAGEMENT SYSTEMS

We can look at a CMS as a publishing tool that allows users to create, edit, delete, and present content in various forms including text, imagery, video, sound, and animation. But there's much more to a CMS than this. A better way to come up with a definition of CMS technology is by pointing to a set of features that are associated with CMS technology [6].

Not all content management systems are created in the same manner. They possess a wide range of functions, components, and scopes that vary greatly based on the users they target. Most CMS applications have four main components:

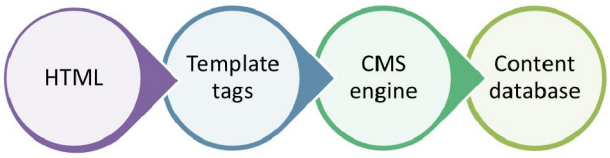

Fig. 1. Basically components of CMS [7]

3.1 PRESENTATION LAYER

Typically built in HTML and CSS (or occasionally Flash), this is the front-end interface with which site visitors interact. The presentation layer should be as clear and seamless as possible with intuitive navigation and frequent calls to action that

guide the user experience. Depending on the used system, the interface is often (but not always) built on the fly when users call up the page in a browser.

3.2 CUSTOM TEMPLATE TAGS

These custom tags or "hooks" provide the conduit by which the front-end design and the content residing in a database come together for front-end user experience. They are snippets of CMS specific code that call up pieces of content and insert them into the interface when a user browses from page to page on a content- managed site. If the interface is built properly, the experience should work flawlessly for users.

3.3 ADMIN INTERFACE

This is, in effect, the CMS engine. Users have a specific and often unique URL to log in and access the site's administrative functions, add or edit content, publish files, perform site maintenance, and soon. Most systems allow interface customization based on user permissions. A content author most likely wouldn't have all the same options as a site administrator would.

3.4 DATABASE

This is literally where the content lives, a database file (or files) that houses text, images, audio, video, user settings, and so on. Ownership, usage, and security are big issues with any site data.

4 VALIDATED CONTENT MANAGEMENT SYSTEM

VCMS is simply a CMS that supports the structure of validating content and bring more features. We will not build a new system, but we will improve the architecture of CMS based on the following concepts [8]:

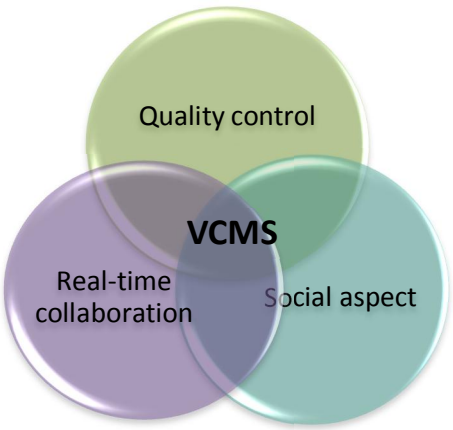

Fig. 2. VCMS principles

- Quality control: in the VCMS content can be published only after passing through the static validation process and will be controlled during his life on the Web by the dynamic validation. A centralized database of content creators used by the VCMS where users are classified as organized by role (expert, validator, producer, and visitor) and domain of experience allows for better evaluation of the content.
- Real time collaboration: The workflow of CMS has an automated mechanism, the author selects a template and a sequence of approvers to approve his content then the automatic workflow does the rest of the work [9]. The mechanism for validating the content requires collaboration between the producer and the validator when content is being static validated. The validator can correct and make changes and help to improve the quality of content at its validation. The implementation of real-time collaboration can facilitate the collaboration and also the rapidity of publication, keeping the mechanisms that allows quality control in our system.
- Social aspect: Users spend more than five and half hours on social networking sites [10]. Social and professional networks, forum and groups are the excellent place to gather information about the user domain of expertise

and interests. This information will be stored in a profile and used later to make the decision in the assignment of validators to certain content based on their domain of expertise.

5 REAL-TIME COLLABORATION

Currently, users of Content Management Systems do not have the ability to work on the same project, they Collaborate even in working together on a single machine or working in parallel on separate copies and integrating them in the end these copies.

The following figure explains the procedure for producing content on the web using a content management system:

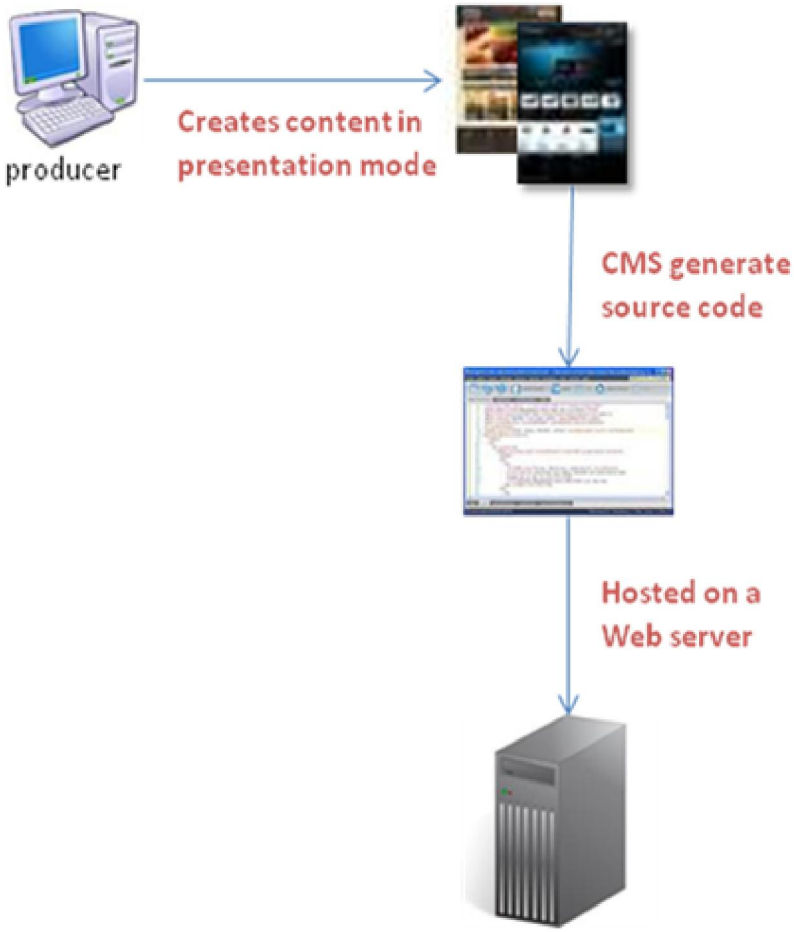

Fig. 3. CMS content production

Our VCMS require collaborative work between users especially between producer and validators which is ideal for collaboration is that both users contribute in the same project.

The following figure explains that the workflow of our system needs collaboration in real time to insure rapidity of publishing quality content:

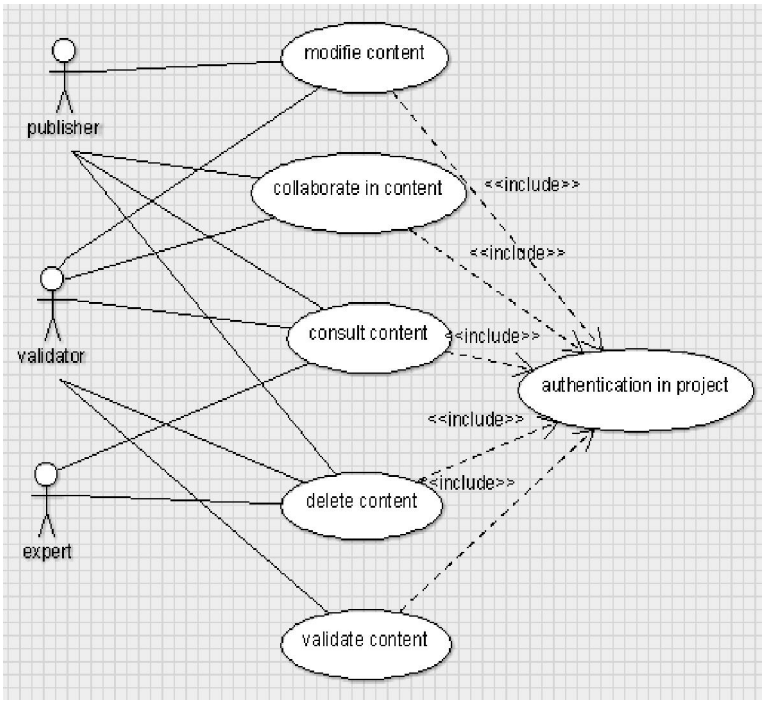

Fig. 4. Use case diagram for users when the content is being validated

Implementation of real-time collaboration is to support the changes made by users on the display interfaces for all users. Source code is always the basis of created content. Changing the source code generated automatically by the VCMS causes the change in presentation for all users. The following figure explains this concept:

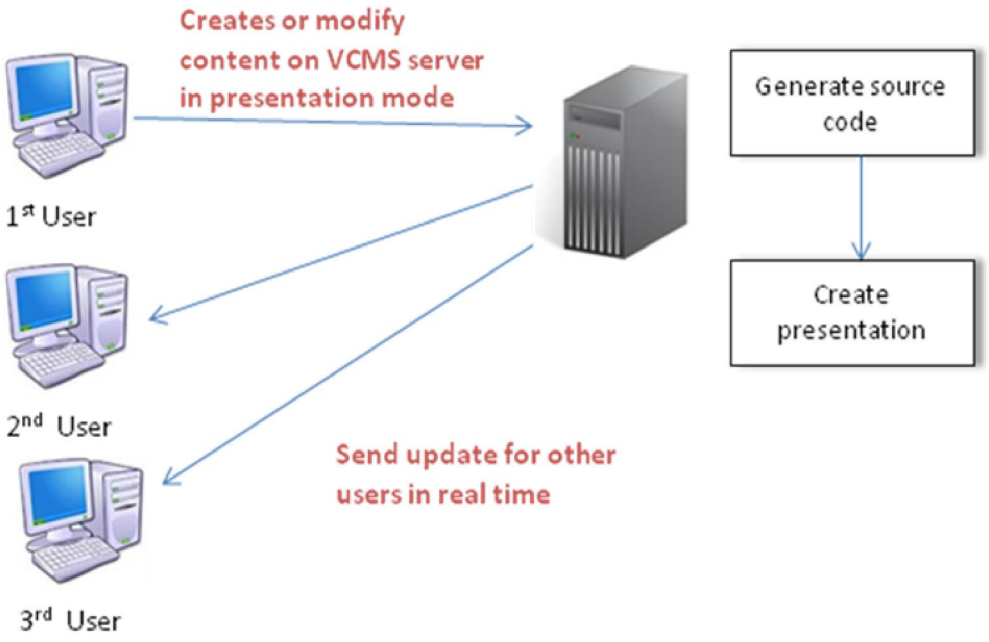

Fig. 5. VCMS real time update

To create or modify content VCMS uses a WYSIWYG editor. It's simply an HTML text area that offers to user options for shaping its page. To collaborate in real time on the same content we have to add real time update for all this text areas. Every component should have its daemon file on the web server. We use a JavaScript file to control modification and send updates to the daemon file.

Figure 6 explains that every web page have a content that is divided into N divisions, every division can be edited with using a WYSIWYG editor. The same division on the same content can be edited by all real time collaborators, so we can have n WYSIWYG editors collaborating on the same division where every editor is on a user interface. The editors of the same division are connected to the same daemon file, this last exchange all updates with all users, so every division have only one corresponding daemon file. In this way all users can receive all updates of the other users.

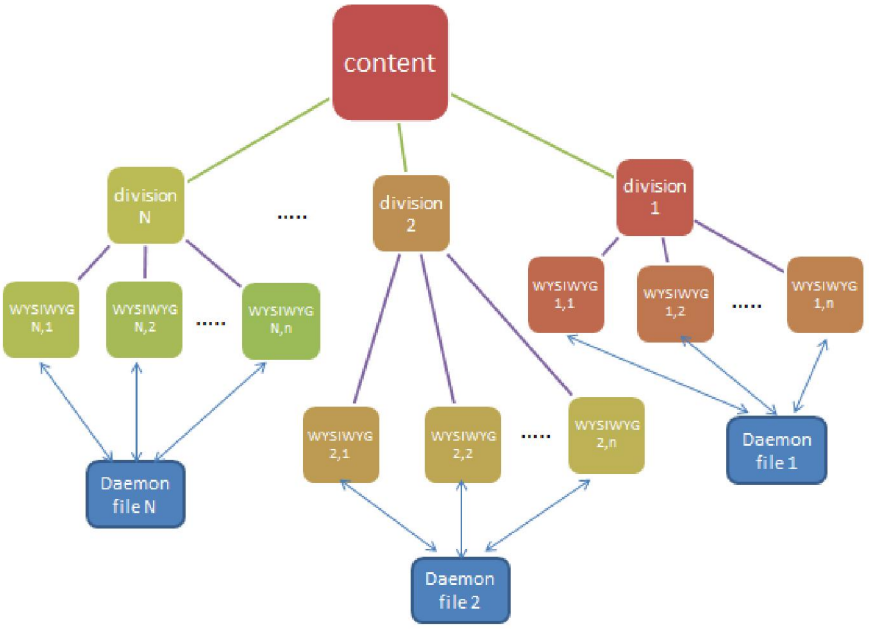

Fig. 6. Managing real time synchronization

The following figure represents a sequence diagram that describes the process of modifying content by a user and synchronization with another user:

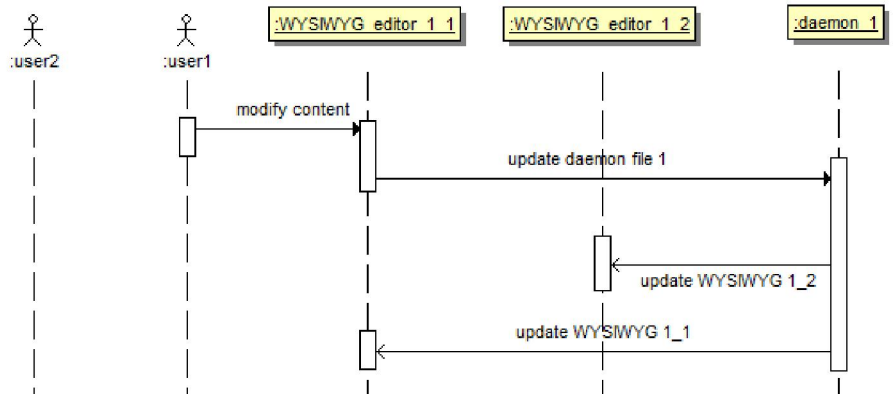

Fig. 7. sequence diagram of modifying content process

6 CONCLUSION

Content Management Systems are widely used to create content on the Web. Validated Content Management System we build uses the mechanism of content validation in building a new generation of CMS. The real time technic is the new concept of Web applications that collaborative workflows needs. We adopted this concept to improve collaboration between users in the hierarchy of content validation.

Finally we note that we have made publication more easier, but the quality of content is always controlled which brings over publishing of relevant content. Prospects of this work will focus on implementing this editor to other tools of Web 2.0.

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Extraction and Characterization of Drilling Fluid from Castor Oil

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ABSTRACT: Drilling fluid is an essential component in drilling operations. It is used to prevent blowouts by creating adequate hydrostatic pressure, lubricating the walls of a well and the drill string, flushing to the surface of cuttings, and keeping the drill bit clean and cool. Extraction, characterization and formation of drilling fluid from castor seed oil were investigated. The castor seeds used were obtained from a local market and the extraction of the oil was done mechanically. The extracted oil characteristics such as specific gravity, pH, acid value, iodine value, saponification value, refractive index and viscosity were within the standard range before before formulating it to drilling fluid by the addition of additives. The result of the formulation obtained showed that the formulated drilling fluid had an electrical stability of 222 V, High Pressure/High Temperature of 8.8, mass funnel viscosity at 30 and 50 ^{o}C were 26.5 and 25 s, respectively; chemical alkalinity was 0.3 and excess lime of 0.39 Ib/bbl. The findings in this research have shown that formulated drilling fluid from castor seed oil is safe as drilling fluid and has characteristics close to that of the standard drilling mud equivalent circulating density 99. The formulated drilling fluid can adequately serve as an alternative to the commercial products.

KEYWORDS: Formulation, castor seeds, drilling mud, oil, borehole, lubrication, petroleum.

1 INTRODUCTION

The petroleum industry is a very important sector worldwide as a lot of other industries and activities depend on its products and services. During the extraction of petroleum, an important operation that must be carried out is the drilling of the pathway for laying the pipes through which oil will be returned from the depth of the earth [1]. Depending on the geology of the area, drilling of the ground can be an expensive operation and is often an important consideration in the overall cost of operation [2]. Drilling of wells can be carried out with or without fluid. However, dry boring result in damage of drill head or transmitter and ultimately fail the making of bores. Oil and water based drilling systems are the two major types of fluid drilling methods [3]. The latter often results to collapse of bores due to a fast filter of water, thermal instability and changes in fluid rheology [4]. The most effective option is oil-based drilling which has lots of benefits such as temperature stability, lubricity and bore stability [2]. Drilling fluids are the bloodline of wells and a wise part of the rotary drilling process which plays a major role in completing a well safety and economics. It is a complex mixture of a fluid phase, a solid phase and a chemical phase, and possess some unique characteristics to fulfill its functional behavior during the course of drilling. Horizontal, multilateral, high angle and open hole systems are some of the common methods employed in drilling petroleum from reservoir [5].

Properly designed drilling fluid enables operator to reach the desired geological ore with lower cost, enhanced penetration of bit and drill string, easier penetration, faster cooling of bits, minimal damage of hole beneath the bit, easier transport of cuttings to the surface at the end of the drilling process and meeting environmental pollution regulation standards [6].

Castor plants from which castor beans and castor oil are subsequently derived are found naturally over a wide range of geographical regions and may be cultivated under a variety of physical and climatic regions. Biological degradable non-edible

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castor oil has several industrial applications such as production of high grade lubricants, manufacture of wax and polishes, crayon, cosmetics, paints and varnish industries application, biodiesel production among others [7] -[8]. The pumice or residue after crushing is used as a fertilizer when the toxin (resin) has been removed. Castor seeds contain averagely 46-55% oil by weight even though there are various species of the seeds. Castor oil contains about 90% (18:1) recinuleic acid (simply unsaturated fatty acids) which is unique among vegetable oils and having the hydroxyl group near the double bond giving it extraordinary viscosity than other oils [9]. The seed contains ricin, ricinine and certain allergens which are protein polysaccharide toxic to man [10]. Neither the resin nor the allergen is carried over to the oil if it is properly extracted, but remains in the meal. However, a method has been found to detoxicate such type of meal [11].

Castor oil has other unique properties such as a great affinity for metal surfaces and highly polar. It is characterized by physical as well as chemical test for an assessment of the quality and purity, and also for identification of the oil. The physical properties include specific gravity, moisture content, refractive index, while the chemical properties include acid value, saponification value, rancidity value and iodine value [8], [10].

2 MATERIALS AND METHOD

The analytical grade reagents used were carbon tetrachloride, potassium hydroxide, DAM's reagent, phenolphthalein, toluene, ethanol, acetone, carbon tetraoxide and starch solution indicator which were products of Merck and Sigma Chemical company purchased from South Africa. Castor seeds were obtained locally from Nigeria market.

The castor seeds were screened and dried in an oven for 12 h at 60 ^{o}C. The dried seeds were winnowed and ground into a paste with the aid of a crusher. The castor paste was fed into a muslin cloth and mechanically pressed while the oil was dripping on a tray. The oil was collected for further use.

2.1 CHARACTERIZATION OF CASTOR OIL

Specific gravity, pH, acid value, iodine value, saponification value, refractive index and viscosity of the oil were determined.

2.1.1 DETERMINATION OF SPECIFIC GRAVITY

Empty specific gravity bottle was weighed (Mc), castor oil was poured into the specific gravity bottle and was weighed to get (Mo). The oil was then substituted with water of the same volume and reweighed to give Mw. The specific gravity was determined by calculation using equation (1):

$$\text{Specific gravity} = \frac{M_O - M_c}{M_W - M_c} \quad (1)$$

2.1.2 DETERMINATION OF PH VALUE

The pH value of oil was determined with the aid of a pH meter (Model Delta 320, Mettler Toledo, China).

2.1.3 DETERMINATION OF ACID VALUE

Using the method specified by International Standard Organization (ISO 279, 1988), the mixture of ethanol and toluene in ratio 1:1 by volume was first neutralized prior to use of ethanolic potassium hydroxide solution in the presence of 0.3 mL of indicator per 40 mL of the mixture.

1.7 g of sample was weighed into a 250 mL conical flask. A few drops of phenolphthalein indicator were added and the content was titrated against 0.1 mg/L solution of ethanolic potassium hydroxide solution until the indicator turned pink. The same procedure was used for the blank. Acid value was determined using equation (2) [7]:

$$\text{Acid value} = \frac{V \times C \times 56.1}{M} \quad (2)$$

where V is volume of the ethanolic hydroxide solution, C is the exact concentration of ethanolic potassium hydroxide solution, M is mass of test sample used and 56.1 g/mol is molar mass of potassium hydroxide.

2.1.4 DETERMINATION OF IODINE VALUE

In accordance with International Standard Organization (ISO 3961, 1989), 1.9 g of the sample was weighed into a conical flask and another 2 g of distilled water was weighed into a conical flask or blank. 10 mL of carbon tetrachloride and 20 mL of DAM's reagent was added to both flasks using pipette in a fume chamber. The mixture was corked, held firm and was allowed to stand in a dark cupboard for some minutes, after which 20 mL of freshly prepared 10% potassium iodide solution was added to each, and 70 mL of distilled water was added and the mixture was titrated with 0.1M sodium thiosulphate until a light yellow colored was observed.

About 1 mL (few drops) of 1% starch solution (indicator) was added to the light yellow substance obtained from titration and shaken thoroughly until the solution became colorless. The iodine value was calculated using equation (3):

$$\text{Iodine value} = \frac{12.69 \times C(V_1 \times V_2)}{N} \quad (3)$$

where C is concentration of sodium thiosulphate, V_1 and V_2 are volume of HCL and sodium thiosulphate used for determination, and N is mass of the sample.

2.1.5 DETERMINATION OF SAPONIFICATION VALUE

About 1.9 g of sample was weighed into a conical flask and 25 mL of 0.1 N ethanolic potassium hydroxide was added to it. The mixture of ethanolic potassium hydroxide and the sample was allowed to boil gently for 30 min and refluxed.

Drops of phenolphthalein indicator were added to the warm solution and titrated with 0.5 M HCL acid until the pink color disappeared (end point). A similar procedure was administered to the blank sample solution. The saponification value was determined using equation (4):

$$\text{Saponification value} = \frac{56.1 \times C(V_o - V_{cl})}{M} \quad (4)$$

where Vo is the volume of HCL of blank solution, V_{cl} is the volume of HCl, C is concentration HCl and M is mass of the sample.

2.1.6 DETERMINATION OF REFRACTIVE INDEX

The refractive index of the oil extracted was determined with the aid of a refractometer. Some drops of the fluid were put into a glass slide and water at 30 ^{o}C enveloping it to maintain its temperature. At no parallax position the refractive index pointer scale was viewed through the eyepiece and recorded. An average of three repeated readings was taken as the refractive index of the oil.

2.1.7 DETERMINATION OF VISCOSITY

The sample was filtered through a sintered glass (five meshes to eliminate solid materials in the liquid oil). This viscometer was charged with the oil by inverting the tube's thinner arm into the oil and suction force was drawn up to the timing mark of viscometer, later the instrument was turned to normal vertical position.

The viscometer was placed into a holder and inserted to constant temperature both set at 27 ^{o}C and allowed for 5 minutes for temperature to attained same value (27 ^{o}C). Suction pressure was applied to the thinner arm to draw the liquid little above the upper timing mark. Readings of afflux time of the flow of the oil as it flows freely from the upper timing mark to the lower timing mark were recorded.

2.2 FORMULATION OF DRILLING FLUID

Calcium chloride (brine) was premixed with water before addition of the castor oil in a base mixer. Primary and secondary emulsifiers, Benton 38, Soltex and Bore plate were chronologically added as well. Graphite wetting agent $CaCO_3$ and Barite were also added. The resulting mixture was characterized.

2.2.1 CHARACTERIZATION OF THE FORMULATED DRILLING FLUID

The formulated drilling fluid's viscosity, electric stability, high pressure/high temperature (HPHT) and chemical analysis were carried out.

2.2.2 DETERMINATION OF VISCOSITY

Sample of drilling mud was poured into a funnel with the orifice for Marsh funnel viscosity was determination. A viscosity cup was placed beneath the funnel tip and the blockage was removed. Viscosity was measured when mud level reached liquid mark on the viscosity cup. Stop watch was used to record number of seconds required to outflow liquid of mud.

2.2.3 DETERMINATION OF ELECTRIC STABILITY

Electric stability (ES) test utilizes a probe with a pair of electrode which is placed in the fluid. Sample was put into a thermal cup and stirred with the ES probe for 30 s. It was heated to 50 ^{o}C and electric stability was adjusted to zero. Electric stability was immersed into the fluid and held firm. Result was obtained by turning voltage knob clockwise until the red light illuminated.

2.2.4 DETERMINATION OF HIGH PRESSURE/HIGH TEMPERATURE (HPHT)

This is run at bottom-hole temperatures under static conditions to determine the condition of emulsion, the filtrate volume and filter cake quality. Some sample of drilling fluid was poured in a high speed mixer; stirred mud was poured into a cell and a filter paper on the top of cell. After that, cell was inverted (cell lid) and carefully placed in a cell heating jacked with thermometer on top of HPHT cell body. With two valves on cell body values A and B tightly closed, valve A was opened to maintain desired temperature of about 50 ^{o}C, then pressure of cell regulator was increased to 600 psi by turning handle clockwise. Filtrate was collected from valve C while maintaining test temperature and pressure drop to 0 psi. Test and thickness of cake was taken after cell was cooled down.

2.2.5 CHEMICAL ANALYSIS

The formulated drilling fluid chemical analysis was carried out by determining the mud alkalinity and lime content and oil/water/solids ratios.

DETERMINATION OF MUD ALKALINITY AND LIME CONTENT

Xylene and isopropanol were mixed in a ratio of 1:1 in a flask. Then 2 mL of mud was added to the mixture and shaken thoroughly until it became homogeneous. 200 ml of distilled water and 10-15 drops of phenolphthalein indicator were added. It was stirred thoroughly and titrated with 0.1M H_2SO_4 until pink the color disappeared.

DETERMINATION OF OIL/WATER/SOLIDS RATIO

The ratio of oil to mud was determined at 650 ^{off}. The ratio Oil/Water/Solid was obtained from equations (5-7):

$$\text{Oil percentage in oil and water ratio} = \frac{100(V_o)}{V_o+V_w} \quad (5)$$

$$\text{Water percentage in oil and water ratio} = \frac{100(V_w)}{V_o+V_w} \quad (6)$$

$$\text{Oil and water ratio} = \frac{\text{oil \%}}{\text{water \%}} \quad (7)$$

Where V_o is volume of oil and V_w is volume of water.

3 RESULTS AND DISCUSSIONS

The results obtained for the characterization of extracted castor oil and formulated drilling fluid is presented in Table 1 and 2, respectively.

Table 1. Comparison of the Physical and Chemical Properties of Extracted Castor Oil with American Society for Testing and Materials (ASTM) Standard Value [12]-[13]

Property	Extracted Oil	Standard Value
Specific gravity	0.9502	0.958-0.968
pH	6.29	6.11-6.29
Acid	2.31 mg KOH/g	0.4-4 mg KOH/g
Iodine value	92.30	81-93
Saponification value	194.1 mg KOH/g	176-187 mg KOH/g
Refractive index	1.468	1.473-1.477
Viscosity	6.5847 st	6.3-6.8 st

Table 2. Comparison of Formulated Drilling Mud with equivalent circulating density (ECD) 99 Drilling Mud [14]

Property	Extracted oil	Standard value
Funnel marsh viscosity at 30^{o}C	26.5	22
Funnel marsh viscosity at 50^{o}C	25	-
Electric stability	222 V	210 V
HPHT	8.8	9.98
Alkalinity	0.30	0.50
Excess lime	0.39 Ib/bbl	0.65 Ib/bbl

The physical and chemical properties of castor oil extracted shown in Table 1 can be compared with ASTM castor oil values.

The specific gravity of extracted castor oil (comparison of the density of the oil with that of water) was found to be 0.9502, which is slightly out of the ASTM standard but above that of dehydrated castor oil [10]. The difference was attributed to non usage of the standard density bottle. Saponification value and refractive index obtained were slightly out range of standard values. Increased in alkalinity in the course of determining the end point of saponification value may have caused the variation. Probable presence of impurities in the oil was attributed to refractive index changes however; it is still within acceptable limits. Variable refractive index of castor oil has been reported by previous researchers [13], [15].

The acid value, iodine value, pH and viscosity fell within the ASTM standards. Acid value of 2.31 mg KOH/g, iodine value of 92.30, pH 6.29 and viscosity of 6.5847 st were obtained. Previous researchers have reported similar finding [9], [15]-[16]. This justified the use of the castor oil extracted for formulation.

Properties of formulated drilling mud mud from castor oil were comparable with standard drilling mud ECD 99 of Arkleen oil and Gas limited, Shell Nigeria. Funnel marsh viscosity at 30 ^{o}C was 26.5 s which is close to 22 s of ECD 99. A difference of 4.5 s was attributed to the higher viscosity of the formulated mud. High Pressure/ High Temperature (HPHT) of formulated drilling fluid is run at bottom hole temperatures under static conditions to determine the condition of emulsion, the filtrate volume and filter cake quality. The HPHT value was found to be 8.8 while the standard ECD 99 is 9.98. High HPHT is commonly associated with a risk of formation damage, stuck in pipes due to excessive filtrate loss, low penetration and compliance with safety and environmental regulations [17]. The alkalinity value was 0.30 as compared with the ECD 99 which is 0.50. The excess lime values for both the formulated drilling mud and ECD 99 were within acceptable limits.

Oil/water is the ratio of the volume percent oil to the volume percent water in an oil mud, where each is a percent of the total liquid in the mud. The results obtained from the formulated drilling mud was of good standard, this is because formulated drilling mud should always have more oil as much as three times greater than water in the liquid content of the mud. This gives excellent lubricity and stability [2].

4 CONCLUSION

The results of the research showed that castor oil can be used to formulate a drilling fluid that has comparable characteristics with ECD 99. These include electrical stability, funnel marsh, viscosity, HPHT, and the chemical analysis. However, some variation of properties observed which was attributed to difference in composition of the castor oil used as compared with the base of ECD 99 were still with tolerance and acceptable standard of formulation of drilling fluid.

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The Survey of Monetary Policies' Effects on the Stock Price and Return

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ABSTRACT: Stock market has a close relationship with the economical structure of every country and its weakness or strength can be indicative of the country's economical status; therefore, the recognition of the factors affecting it and the amount of this effect can be of a significant value. One of these factors is monetary policy, which is adopted by the central bank, and is the focus of the current study. The current study objective is to investigate the monetary policies effects exerted by the central bank on the stock price and stock returns in the Tehran's stock market during the years from 1999 to 2010. The hypotheses test method in the current study is the linear regression in the form of combinational data time panel, and time series which is conducted by making use of Eviews software. The study results implies that in the firm level, liquidity has a negative and significant relationship with stock returns and it has a positive and significant relationship with the firm stock price at the end of the period. In the market level, unexpected changes in the monetary policies does not show an effect on the stock returns, but the expected changes have a negative and significant relationship with the stock returns. Also, the effect of the monetary policies and the stock returns is asymmetric. Overall, the evidence lends support to the notion that the monetary policy announcements have a significant effect on stock market.

KEYWORDS: Monetary Policies, Stock Returns, Stock Price, Stock Market, Central Bank.

1 INTRODUCTION

Iran's stock market in line with the government's macro-economy policies, after the end of the Imposed War and to attract nation's participation in investing and leading the stagnant and unprolific capitals toward the productive economical activities and to obtain the financial needs of the producing institutions and as a consequence to secure the required commodities for the society, launched its more expanded operation from 1990. Since then, due to the post-war conditions and the changes stemming from the macro-economy variables such as inflation rate and the exchange rate on the stock market, the stock market has been witness to a lot of fluctuations.

In the study of the influencing factors on the market or the market economy, searching for a variable(s) which can account for the economy financial sector relationship with the economy veracious sector, is of a significant value. Monetary and capital markets as the fundamental blocks of the financial body are in charge of securing resources for the economy real sector. Securing resources efficiency allows for the optimum allotment of the sparse resources to the economical operations. Markets consisting of the capital make the loans and the needed financial resources available by providing the possibility of mid-term and long term securities transactions for corporations, institutions and economical organizations on the one hand, and provide the presenters of such resources with suitable return on the other. Therefore, the financial markets are considered as one of the strong levers in the countries' economies and they act in favor of accelerating the economical development specially developing countries.

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As a result, the recognition of the factors affecting this market and the amount of these factors effects is of a great value and owing to this in the recent years numerous researches have been conducted in the current field in which some of the factors have been studied. One of the factors which can be effective in this field is the central bank monetary policy which has been the focus of the researchers' attention and various results have been obtained in each of them.

Generally, the current study objectives are as follows:

- The survey of the monetary policies effects on the stock returns and price and stock price in the firm level.
- The survey of the expected and unexpected monetary policies effects on market return
- The survey of the symmetry and asymmetry of the monetary policies effects on the market return

2 REVIEW OF THE RELATED LITERATURE

Graham [1] showed that the relationship between the stock returns and inflation is instable; i.e. it is positive in some of the periods and negative in others. The results obtained by Lee [2] showed that there is a negative relationship between inflation rate and stock returns, some of the studies also showed that the contracting (expanding) monetary policies reduces (increase) the stock basket including.(e.g. [3]).

Ehermann and Fratzcher [4] introduced some evidence that the stock market reaction relative to the monetary policy is very asymmetric. They divided S&P's 500 shares into several groups based on the firm's financial limitations degree and they found out that the companies with larger financial limitations were influenced significantly by the monetary policies.

By using Markov-Switching Model, Chen [5] studied the monetary policies asymmetric effects on the stock returns. He concluded that in less booming markets and stagnant markets, monetary policies have a greater effect on the stock returns and a contracting monetary policy is more likely to lead the market towards a less booming market.

Farka [6] found out that a strict and unexpected monetary policy has a slighter effect compared to an unexpected easy-going monetary policy.

Dennis Jansen and Chun-Li [7] studied the asymmetry in the monetary policies shocks effects on the stock returns in the booming and stagnant markets in the time span from 1994 to 2005 and they found out that the monetary policies shocking effects on the stock returns in the big stagnant markets is negative and significant from the statistical point of view.

Chaiporn Vithessonthia and Yaowaluk Techarongro wongb [8] found out that the raw change in the repurchase rate has a negative effect on stock returns at the market level. Besides, contrary to the results of numerous studies, they found out that in the market level, expected changes in the discount rate have negative impact on the stock returns and unexpected changes in that have no effect on the stock returns, but in the firm level unexpected changes in the discount rate have no effect on the stock returns.Moreover, stock market reaction to the discount rate is asymmetric. Unexpected changes effects on the redeem rate which is considered as good news has a negative effect on the stock returns.

3 RESEARCH HYPOTHESES

According to the study objective and cited theoretical literature the following hypotheses are compiled:

H1: There is a significant relationship between the liquidity and the firm stock.

H2: There is a significant relationship between the liquidity and stock returns.

H3: There is a significant relationship between the unexpected changes in the monetary policies and the stock returns.

H4: Monetary policies effect on the stock market is asymmetric.

In the present study, liquidity has been a representative of the monetary policy.

4 RESEARCH METHODOLOGY

4.1 RESEARCH DATA AND STUDY POPULATION

The study methodology is of correlational type, in nature, and is functional from the objective point of view. The study data collection is conducted via library method in order for the theoretical discussions to be expressed and also field study (through bourse real information and central bank time series data) has been taken advantage of. The study required data

has been collected from the information resided in the Tehran's stock exchanges market informative site, internal and external articles, library studies in the libraries and universities and the central bank time series data.

The study objective is the survey of monetary policies adopted by the central bank on the stock returns and price of the Tehran's stock exchange market.

During the years between 1999 and 2010, the study samples should possess the following features:

They should be a member in the stock exchange market in the time period, its fiscal year should end in December, they shouldn't be investing companies, the data required for the survey should be existing in them. Based on the above-mentioned limitations, the total numbers of 72 companies, from among all of the study population, were chosen as the study sample.

The data related to the stock price and return, book value relative to the market and Beta risk were extracted from the extant software in the Tehran's stock exchange market and the data related to the liquidity was extracted from the central bank site. As Chaiporn and Yaowaluk [8], due to the lack of predictive rates of monetary policies in Thailand, used vector auto-regression (VAR model) to estimate the expected monetary policy in Thailand and obtained similar results to the time that they used Bloomberg database, in the current study VAR model has been used to predict the monetary policy.

4.2 Data Collection and Analysis Method

At first normality of the dependent variables was analyzed via Jarque-Bera test and in case of abnormality the Box-Cox function and the Jansen transfer function were applied and then the variables durability was tested by applying ADF test. Afterwards, to test the effect of the monetary policy on the stock returns and price in the firm level, first, the data related to the every company's stock returns and price were collected and then the Chow's Forecast Test was utilized to determine the use of the conditional panel or data methods and the following two regression models were applied:

$$Y1=a+\beta 1X1+\varepsilon \quad \text{(EQ1)}$$

$$Y2=a+\beta 1X1+\varepsilon \quad \text{(EQ2)}$$

Where, Y1 denotes the firm stock price, X1 denotes the liquidity in the time t, ε is the error statement, Y2 is the stock returns considering the company's capital, and to survey the two above models, we took advantage of the following tests: F-test to survey the overall significance of models, the use of the Jarque model to test the normality of the residuals obtained from the models estimation, the use of the Durbin-Watson test to study the residuals independence (entering the dependent variable in a delaying manner in case of the autocorrelation existence) and the use of the determination coefficient (R^2) to diagnose that what percent of the dependent variable changes are being accounted for by the dependent variables.

In the next stage to evaluate the expected and unexpected monetary policies effects on stock returns and also to survey the symmetric and asymmetric monetary policies effects on the stock exchange market, the following measures were taken:

In the previous two models we didn't distinguish between the expected and unexpected monetary policies. As several scientists (like Bernanke and Kutner [9] , Chaiporn and Yaowaluk [8] focused on the evaluation of expected and unexpected monetary policies effects, we also used the following model to evaluate the issue in Iran:

$$R_{mt} = \alpha + \beta^{e} \Delta i_t^{e} + \beta^{u} \Delta i_t^{u} + \varepsilon \quad \text{(EQ3)}$$

Where, R_{mt} is the sample companies return balanced average, α is the latitude from the source, ε is the error statement, Δi^{e}_{t} is the expected element of the monetary policy which is obtained from the difference of expected monetary policy in the time t and the real monetary policy in the time (t-1) and Δi^{u}_{t} is the unexpected portion of the monetary policy which is obtained from the difference of real changes in liquidity and expected changes in liquidity (Δi^{e}_{t}).

As several studies found out that the monetary policies effects on the stock market is asymmetric, we also evaluated this issue in the Iran's texture based on the following model:

$$R_{mt} = \propto + \beta_1 \text{risk} + \beta_2 BMV_{i,t} + \beta^{e} \Delta i^{e}_{i.t} * GD_{i,t} + \beta^{u} \Delta i^{u}_{i.t} * BD_{i,t} + \varepsilon \quad \text{(EQ4)}$$

Where, R_{mt} is the balanced average stock returns, α is the latitude from the source, Risk denotes the risk which is excerpted from the balanced average of the firm Beta risk, BMV is the proportion of the book value to the stock market which is entered from the firm proportion balanced average as the control variable, GD is a dummy variable for good news which is given number 1 if the announcement is assumed to provide favorable information for the investors, and otherwise it is given zero.

In the third and fourth models, seasonal time series were used in the firm level.

5 RESEARCH EXPERIMENTAL RESULTS

5.1 DESCRIPTIVE STATISTICS AND DATA TEST

5.1.1 DESCRIPTIVE STATISTICS

In the descriptive statistics, data analysis was performed by making use of central indexes such as average and median and standard deviation dispersion index, skewness and kurtosis.

In table one the results of model 1 and 2 data descriptive statistics results and in table 2 the descriptive statistics results of model 3 and 4 are shown:

Table 1. The study variables descriptive statistics for the model one and two data

Variables	number	Average	median	Std deviation	Skewness	kurtosis	minimum	maximum
Stock returns	831	40.88167	21.63	69.72635	2.265	11.30	-63.29	494.61
Stock price	847	8743.083	5217	92502	3.567	18.637	656	92502
Liquidity	864	887992.8	6062232	709930	0.78567	2.2669	160401	2355889

Table 2. The study variables descriptive statistics for seasonal data in the form of time series

Variables	number	average	median	Std deviation	skew ness	kurtosis	minimum	maximum
Market return	48	11.93958	6.9050	22.94539	3.550	16.97	-10.29	129.100
Market risk	48	1.06248	0.8850	1.373	0.856	3.816	-1.180	5.095
Book value to market	48	0.5196	0.438	0.2497	0.9158	2.7389	0.20	1.12
Expected monetary policy	48	44019.96	30325	38105.9	1.215	3.3413	8209	147384.6
Unexpected monetary policy	48	2263.4	244.57	32514.7	-0.805	6.153	-103261	85638.5
Good news	48	0.5208	1	0.5048	-0.0833	1.0069	0	1
Bad news	48	0.479	0	0.5048	0.0823	1.0069	0	1

5.1.2 DEPENDENT VARIABLES NORMALITY TEST

Since in the current study the normal least squares method has been used in order to estimate the models parameters and this method has been based on this assumption that the study dependent variable is distributed normally, this variable abnormal distribution leads to the violation of the hypotheses in order for the parameters to be estimated, therefore, it is required that the study dependent variable normality be tested. In the current study, this issue has been studied via Jarque-Bera Statistics. The study test results are shown in table 3.

Table 3. The normality test results of the dependent variable distribution

Variable	Jarque-Bera statistics	Significance level
Stock returns	3097.232	0.000000
Stock price	10426.07	0.000000
Market return	491.21	0.000000

The results obtained from Jarque-Bera test are suggestive that none of the study dependent variables enjoy a normal distribution. Therefore, it is necessary to normalize these variables before testing the study hypotheses. In this study, the Box-Cox function and Johnson function were used to normalize the data. The results obtained from Jarque-Bera test after normalizing process are as follows:

Table 4. The results obtained from the dependent variables normality after normalizing process

Variable	Jarque-Bera statistics	Significance level
Stock returns	1.072566	0.584919
Stock price	9.965765	0.006854
Market return	1.109372	0.574253

5.1.3 VARIABLES STATISTICS TEST

If time series variables are not static, a problem known as false regression exposes itself. A time-series variable is static when its average, variance, and autocorrelation coefficient stay constant during the time. In the current study to the test the staticity the aggregate Dicky-Fuller test was used. The study results are presented in tables 5 and 6.

Table 5. The model 1 and 2 data statistic test by utilizing aggregate Dicky-Fuller test

Variable	Pause number	ADF amount	prob
Stock returns	0	262.629	0.00
Stock price	0	208.230	0.0004
liquidity	2	593.668	0.00

Table 6. Time-series stativity test by using aggregate Dicky-Fuller test

Variable	Lag length	Test rank	ADF statistic amount	Critical amount in 5%	prob
Market return	0	Level	-5.47896	-2.9251	0.000
Market risk	0	1st difference	-3.22192	-2.9266	0.0250
Book value to market value	0	Level	-7.76994	-2.9266	0.000
Expected monetary policies	2	Level	-30.2214	-2.9281	0.0001
Unexpected monetary policies	2	Level	-20.0778	-2.92814	0.0001

5.2 HYPOTHESIS TESTING

H1: there is a significant relationship between liquidity and stock price.

According to the Chow test results and P-value in the first model, since P-value is less than 0.05, to estimate the model it is necessary to use the panel data method. Therefore, in these models, in order to determine which method (random effects or constant effects) better suits the estimation, Hussman test was used. In this test, H0 hypothesis is suggestive that there is no relationship between subversion element related to the latitude from the source and explanative variables and they are independent. In Hussman test, if H0 hypothesis is rejected, the constant effects method is used and in case H0 hypothesis is accepted, random effects methods is used.

According to Hussman test results for model one and P-value which is more than 0.05, it is necessary to test the model by making use of random effects.

Table 7. The results obtained from Hussman and Chow test for EQI model

Model	Test type	Test value	Test value amount	Test degree of freedom	P-value
Model 1 (EQ1)	Chaw	F	14.753036	(71,774)	0.00
	Hussman	X^2	1.443055	1	0.2296

The results obtained from this model are presented in table 8:

Table 8. the results obtained from model 1 estimation

Variable	coefficient	t-statistic	p-value
Constant coefficient	0.075825	7.164411	0.00
Liquidity	0.000001	6.641620	0.000
N-Y02(-1)	0.845776	40.68958	0.00

In table 9, a summary of the tests related to the regression assumptions has been given:

Table 9. The models statistics estimation and the test related to the regression assumptions(model 1)

Model	Determination coefficient	F-value		Jarque-Bera value		Durbin-Watson value
	R^2	F	P-value	X^2	P-value	D.W
EQ1	0.7495	1152.3	0.00	0.5924	0.7436	1.8916

To evaluate the models overall significance according to the F-value, probability amount being less than 0.05, the overall models significance is verified with a 95% of confidence. To study the models statistical hypothesis, the results from the Jarquo-Bera test shows that the test related probability is more than 0.05 and therefore the residuals obtained from the model in the 95% confidence level has a normal distribution. The figures related to the determination coefficient show that about 75% of the dependent variable variation (companies 'stock price) is determined via independent variable. In relation to the residues independent test, the results obtained from the Durbin-Watson preliminary test is indicative that the residuals have autocorrelation problem for the removing of which the study dependent variable has been entered into the model in a delaying manner. After the entrance of this variable, the amount of the Durbin-Watson value approaches 2 and the residuals autocorrelation problem has been removed.

H 2: there is a significant relationship between the liquidity and the stock returns.

According to the Chow test and its P-value, combinational data method can be taken advantage of for estimation. The results obtained from the Chow test are shown in table 10.

Table 10. The results obtained from bound F-test for EQ2 model

Model	Test value	Test value amount	Test degree of freedom	P-value
Model 2(EQ2)	F	0.725721	(71,758)	0.9552

In table 11, the results estimated from model 2 are indicated.

Table 11. The results estimated from the model 2 estimation

Variable	coefficient	t-statistic	P-value
Constant coefficient	0.309054	6.537354	0.000
Liquidity	-0.000001	-8.042514	0.000

In table 12, a summary of the test related to the regression assumption has been given:

Table 12. The results obtained from the models estimation and the tests related to the regression assumption

Model	determination coefficient	F-value		Jarque-Bera value		Durbin-Watson value
	R^2	F	P-value	X^2	P-value	D.W
Model 2(EQ2)	0.06847	60.936	0.00	8.9789	0.0112	1.9689

In the evaluation of the models significance, based on this matter that the amount of F-value is less than 0.05, with the confidence of 95%, the significance of all of the models is verified. The figures related to the determination coefficient shows that about 6% of the dependent variable variations (companies' stock returns) are determined by means of independence variable.

H 3: There is a relationship between unexpected change in monetary policy and stock returns.

Because of the correlation between independent variable not being strong (less than 0.7) it can be said that the problem of co-linearity between them has not existed and simultaneous entrance of these variables in the model does not cause the co-linearity.

In table 13, the results obtained from model estimation and in table 14 the results and tests related to the third model regression assumption have been given:

Table 13. The results obtained from the third model hypothesis

Variable	coefficient	t-statistic	p-value
Constant coefficient	0.5018	1.9085	0.0632
Δi^e (-1)	-0.000011	-2.402306	0.0208
Δi^u (-1)	-0.000004	-1.005251	0.3205
AR (1)	0.199476	1.271661	0.2105

Table 14. The results of model estimation values and the tests related to the second hypothesis regression

Model	determination coefficient	F-value		Jarque-Bera value		White value		Durbin-Watson value
	R^2	F	P-value	X^2	P-value	W	P-value	D.W
Model3	0.21036	3.7296	0.018	1.1314	0.5679	0.2535	0.98	1.9962

According to the results of the F-test (0.01827) with the 95% of confidence the overall model is verified. The models determination coefficient is indicative that 21.03 percent of the stock returns variations are accounted for by the variables entered in the model. The results of Jarque-Bera test is suggestive that the residuals obtained from the model estimation in the confidence level of 95% have normal distribution. In relation to the residuals independence test, the preliminary results also are indicative that the residues have autocorrelation problem for the removing of which the first time auto-correlated variable AR(1) has been entered to the model in a way that after entering this variable, the Durbin-Watson value approaches to 2 and the residuals autocorrelation has been resolved. In the assessment of the residuals variance inconsistency, also the white test results (0.9829) are suggestive that the residuals variance is similar.

H 4: the monetary policy effect on the stock market is asymmetric.

The results obtained from the Pierson correlation coefficient shows that the co linearity problem does not exist between variables.

The results obtained from the estimation are shown in table 15, and the results obtained from the regression hypothesis are shown in table16:

Table 15. The results obtained from the fourth hypothesis estimation

Variable	coefficient	t-statistic	p-value
Constant coefficient	0.044127	0.117556	0.9070
risk	-0.028059	-0.213719	0.8319
BMV	1.927302	2.621201	0.0123
Δi^{e} (-1)*GD	-0.000028	-2.928622	0.0056
Δi^{u} (-1)*BD	-0.000019	-3.241069	0.0024
AR (1)	0.066945	0.381042	0.7052

Table 16. The models value estimation results and the tests related to the fourth regression assumption

Model	determination coefficient	F-value		Jarque-Bera value		White value		Durbin-Watson value
	R^2	F	P-value	X^2	P-value	W	P-value	D.W
model 4	0.270072	2.95997	0.02295	1.417353	0.4922	0.4727	0.954	1.9375

The above table's interpretation is as before and for the sake of not being repetitive we withdraw from interpreting them.

6 CONCLUSION

In the presented study, firstly, we dealt with the study of the monetary effect on the stock returns and the stock price in the firm level for 72 companies. The results obtained from model one (table8) shows that there is a positive and significant relationship between the liquidity and the stock price that is to say with an increase in the liquidity, stock price increases accordingly. Therefore, the first hypothesis is accepted and its high determination coefficient (0.74) is suggestive of the strong relationship between price and return. Model 2 results (table 10) also shows that in the firm level there is a negative and significant relationship between liquidity and stock returns, so the second hypothesis was accepted accordingly. One of the reasons for the increase in the stock price can be inflation resulted from the increase in the liquidity which is a cause for the increase in the companies increase in the assets price; therefore the investors, for making decision about investing in the stock market, are advised not to pay attention only to the stock price and consider other factors such as return. From among the reasons which can cause different conclusions about stock returns with the stock price we can refer to this subject that when we face an increase in the liquidity, the reduction in other factors influencing the return calculation has been more than increase in the stock price and this has brought about a decrease in stock returns.

To test the expected and unexpected monetary policy effect on the stock returns and the assessment of the symmetry or the asymmetry of the monetary policies effects on the stock market in Iran, we made use of time series data.

Model 3 results (table 13) showed that unexpected monetary policies have no effect on the stock returns and the stock price and as a result the third hypothesis was rejected in the confidence level of 95%. But, the expected monetary policies have a significant and negative effect on the stock returns of the companies and these two results are consistent and similar to Chaiporn's [8] findings.

So central bank can attract people toward investing in the capital market by using its encouraging policies and the government can make appropriate credit token available for the stock exchange companies by making use of predicted and optimum monetary policies and pave the way for the increase in these companies' price and return.

The results obtained from model 4 (table 15) showed that the effect of monetary policies good and bad news influences the stock market return asymmetrically and the amount of their influence on the stock market return is different from each other. Therefore, the fourth hypothesis is accepted and it can be said that the monetary policy effect on the Iran's stock market is asymmetric and this is consistent with and similar to Chaiporn's [8] study results finding.

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Detection of Germination inhibitors in fruits of *Terminalia laxiflora* Engl. & Diels using biochemical assays

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ABSTRACT: *Terminalia laxiflora* is multipurpose tree in Sudan. But it has low germination percentage, which may affect its natural regeneration. There were evidence that the fruits have an inhibitory effect, so this study was carried out to determine which part of the fruit that affect germination and seedlings growth. Three parts of the fruit extraction were examine (Coat, Pulp and Wing) with tow concentration to each part (200 fruit/litre, 100 fruit/litre).the results showed that all extractions had no effect on germination percentage except fruit coat extract (200 fruit/litre), which reduced it significantly. The different extractions had no effect on root length and seem to elongate the shoot expect fruit pulp (200 fruit/litre), which no different from control. All extractions had no effect on first leave appearance, but they causing abnormal seedlings. The result suggest new treatments that could be applied on the fruit of this species like de winging or de pulping the fruit before sewing or soaking in acid or hot water after de winging, de pulping and de coating. These results can be of great value for the medicinal plant scientists and users to try *T. laxiflora* fruit extractions for controlling bacteria and fungi activities and it may be an addition benefit to the medicinal uses of this tree.

KEYWORDS: *Terminalia laxiflora,* Germination, Inhibitors, fruit extracts.

1 INTRODUCTION

Seeds of many tree species germinate readily when subjected to favourable conditions of moisture, oxygen and temperature, many other species posses some degree of dormancy. Where dormancy is strong, some form of seed pre-treatment is essential for artificial regeneration, in order to obtain reasonably high germination rate in a short time [10]. Dormancy may be of several different types and sometimes more than one type occurs in the same seed [4]. There were numerous publications of phytotoxic molecules being produced by plants, a phenomenon generally termed allelopathy, It has been known for centuries that walnut trees poison the soil for underlying vegetation [9], [8], [5] Some substances that are produced naturally by plants were found to inhibit seed germination. These inhibitors don't reduce seed viability or cause any defects in seedling after germination. These inhibitors were found sometimes in the seed coats or fruit pulp or endosperm or embryo. The presence of these inhibitors in plants are common, and some of the natural plant inhibitors that were determined include Coumarin, Parascorbic acid, Ferulic acid, ABA, Cyanide – releasing, Ammonia – releasing, Phenolic compounds, Alkaloids, Organic acids. But ABA is the most wide spread natural inhibitors. [11], [6]. Terminalia spp is common indigenous species in wood land and semi humid Savannah of the Sudan. It is useful multipurpose species with a high

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potential of timber production, medicinal uses etc... From previous studies at the National Tree Seed Centre [7]) the poor germination of seeds is an obstacle for plantation of the species. Poor germination was found to be partly due to the combined dormancy chemical. With regards to other problems that faces the individuals of this family such like agricultural expansion, climate fluctuation and missus of these species may put them of the endangered trees in Sudan. So this work aimed is determined of inhibitory effects of the different parts of the Terminalia laxiflora fruit on seed germination and seedlings growth.

2 MATERIALS AND METHODS

Fruits were collected from Elnour forest at Blue Nile State (2006) for extractions the fruit were prepared as followed:

1. Dewinged: The fruits wings were removed, crushed and grinded.

2. Decoated: The fruits coats were removed, crushed and grinded.

3. Depulped: The pulps were extracted, crushed and grinded.

Every part was extracted with methanol in the laboratory of the Aromatic and Medicine plants institute. Every extraction was diluted with distilled water for tow extractions 0.001 and 0.002.

The concentration 100 was equivalent to extracting 100 fruits as followed:

$$\text{Weight of one extracted unit} = \frac{\text{Weight of extracted substance x Weight of one crushed unit}}{\text{50 gram of each grinded substance (wing, pulp)}}$$

And 200 equivalent to 200 fruits.

Acacia mellifera seeds were sown in sand in petri- dishes and were irrigated with prepared extractions versus a control irrigated with tap water.25 seeds in each Petri dishes for four replicate to each treatment were used (three seed extractions with two concentrations).

The germination percentage and first leaf emergence were calculated every 3day for 15 days. The length of shoot and root were measured. The abnormal seedlings (seedlings without root or without shoot, discolouration) were also recorded.

3 RESULTS AND DISCUSSION

The results in (table 1) and (figures 1, 2,3,4,5,6,7) showed that the germination percentage of *Acacia mellifera* seeds was not affected when watered with *T. laxiflora* extractions of different fruit parts, except when *Acacia mellifera* seeds were watered with seed coat extraction with concentration 200 fruit/litre, which reduced the germination percentage significantly compared with other extractions. These extractions had the tendency to inhibit seeds germination when the extractions concentrations were raised.

The length of shoot of *Acacia mellifera* was significantly affected with *T. laxiflora* extractions and unexpectedly it seems to elongate the shoot length compared with the control and 200 fruits pulp extraction. This result may be explained by the effect of extractions on root pattern (table 1). Such pattern was recorded [8] when *Glysine max* subjected to ABA treatment and water – deficit, water – water deficit always reduces protein synthesis. Reference [1] reported wheat cultivars root growth affected with some plant residues rather than shoot. May be the seedlings have a certain mechanism to escape the effect of inhibitors in the extracts by this elongation. The length of root of *Acacia mellifera* seedlings was significantly affected when it was irrigated with *T. laxiflora* fruits pulp extraction compared with other treatments including the control (table 1). *T. laxiflora* fruits pulp extractions reduce the root length of the seedlings which indicates that it had some substances which inhibit or delays root growth. This finding agrees with [2] who stated that aqueous extracts of *Solanum lycocarpus* significantly reduced root growth and inhibited root hair and lateral root. Reference [3] also reported an inhibitory effect of siam weed on growth of root and stem differentiation in Sesame seedlings.

T. laxiflora seeds extract significantly doesn't affect the first leaf appearing although there was a tendency to delay the first leaf appearing compared with the control (table 2). The results showed the inhibitory effect of different extractions on creating abnormal seedling especially the extraction of fruits wings (table 3).

Table 1. Effect of Terminalia laxiflora fruits extract on A. mellefera seeds germination and seedlings performance

Treatments	Mean of germination %	Mean of shoot length/ cm	Mean of root length/ cm
Control	45.6 a	3.1 b	2.3 a
Fruits pulp 200 fruit/litre	41.4 a	3.9 b	1.9 b
Fruits pulp 0.001	50.1 a	5.2 a	2.7 a
Fruits wing 200 fruit/litre	42.6 a	4.8 a	3.4 a
Fruits wing 0.001	47.3 a	4.7 a	2.5 a
Fruits coat 200 fruit/litre	35.8 b	5.4 a	2.5 a
Fruits coat 0.001	41.4 a	6.1 a	3.5 a
P ≥	0.04	0.006	0.02
SE ±	4.9	0.05	0.4
CV=	22	38	38

Table 2. Effect of Terminalia laxiflora fruits extracts on A. mellefera seedlings first leaf appearance

Treatments	Mean No of first leaf appearing after 3 days	Mean No of first leaf appearing after 6 days	Mean No of first leaf appearing after 9 days	Mean No of first leaf appearing after 12 days/No
Control	9.1 a	20.1 a	31.7 a	39.7 a
Fruits pulp 200 fruit/litre	10.2 a	15.1 a	20.5 a	29.9 a
Fruits pulp 100 fruit/litre	0 a	17.5 a	27.3 a	42.5 a
Fruits wing 200 fruit/litre	8.2 a	14.5 a	16.1 a	33.5 a
Fruits wing 100 fruit/litre	16.2 a	17.2 a	22.1 a	30.7 a
Fruits coat 200 fruit/litre	4.1 a	13 a	14.7 a	32.7 a
Fruits coat 100 fruit/litre	6.9 a	16.2 a	24.9 a	33 a
	p≤0.93	p≤0.45	p≤0.6	p≤0.8
	SE±2.5	SE±5.1	SE±6.9	SE±6.7
	CV=104	CV=128	CV=59	CV=36

Table 3. Effect of Terminalia laxiflora fruit extracts on seedling abnormality Acacia mellifera

Treatments	Mean/ No of seedling up normality	Rank
Fruits pulp 100 fruit/litre	6.8	ab
Fruits pulp 200 fruit/litre	8.1	ab
Fruits Wings 100 fruit/litre	16.5	a
Fruits Wings 200 fruit/litre	5.1	ab
Fruits Coats 100 fruit/litre	4.1	b
Fruits Coats 200 fruit/litre	0	b
Control	2.9	b

P≤ 0.002 SE± 4.2

Fig. 1. Effect of T. laxiflora fruit s coats extractions (200 fruit/litre concentration) on A. mellifera seedlings

Fig. 2. Effect of T. laxiflora fruit s pulps extractions (100 fruit/litre concentration) on A. mellifera seedlings

Fig. 3. Effect of T. laxiflora fruit pulps extractions (200 fruit/litre concentration) on A. mellifera seedlings

Fig. 4. Effect of T. laxiflora fruit s coats extractions (100 fruit/ litre concentration) on A. mellifera seedlings

Fig. 5. Effect of T. laxiflora fruit s wingss extractions (100 fruit/ litre concentration) on A. mellifera seedlings

Fig. 6. Effect of T. laxiflora fruit s wings extractions (200 fruit/litre concentration) on A. mellifera seedlings

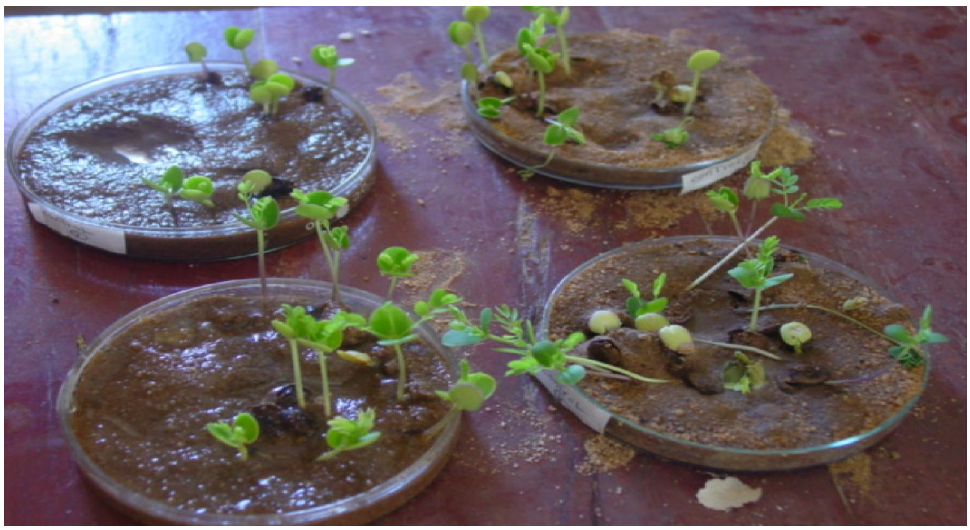

Fig. 7. A.mellifera seedlings watered with tap water (contrrol)

4 CONCLUSION AND RECOMMENDATIONS

It is clear from these results that the wings of *T. laxiflora* had chemical substances that affected the normal formation of the seedlings, and when concentration was raised, the number of abnormal seedlings increased (abnormality seedling appears as seedlings have shoot without root, the shoot was reddish). These substances may play an important role for this species in its natural habitat by eliminating the competition of other species that live in the same ecological place especially in the first stage of the seedlings development.

These results suggest new treatments that could be applied on the fruit of this species like de winging or de pulping the fruit before sewing or soaking in acid or hot water after de winging, de pulping and de coating. These results can be of great value for the medicinal plant scientists and users to try *T. laxiflora* fruit extractions for controlling bacteria and fungi activities and it may be an addition benefit to the medicinal uses of this tree.

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The Effects of External Financial Shocks on Financial Integration and Economic Growth: A VAR Approach for Maghreb Countries

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ABSTRACT: The main objective of this paper is to quantify the importance of external shocks in domestic and external variables fluctuations for a sample of three North African countries (Algeria, Morocco, and Tunisia) using a VAR model estimation with quarterly data during the period 1990-2010. Since the early 1990s, Maghreb countries have implemented these last year, structural liberalization policies and modernized banking and financial regulations in order to strengthen their financial systems, establish an economic union between them and improve their economic growth rates. Accompanying to these developments, the study of this relationship has been largely analyzed in the literature. In fact, several theoretical and empirical studies have been elaborated to understand the process of international banking and financial shocks and their impact on economic development of countries as well as on the ability to create economic integration between them. Results find that external shocks negatively affect economic growth of Maghreb countries and impede the implementation of financial integration project. In addition, we document the dynamic response of each studied variable to external financial stress in these economies. Our results on variance decompositions and impulse responses functions show that Maghreb countries appear especially sensitive to the trade and the financial channel.

KEYWORDS: Financial integration, external shocks, financial crisis, Maghreb countries, VAR approach.

1 INTRODUCTION

Since the 1990s, the most developing countries have embarked in a process of financial integration characterized by a reduction of impediments to cross-border financial transactions and an increased participation of foreign institutions in the domestic financial systems. In the view of some analysts (*Galindo and al. 2009; Kazi and al. 2012*), the propagation of the crisis from developed countries to emerging market economies through financial channels is proof of the need to impose limits on financial integration process. Accompanying to these developments, a growing amount of literature on this topic has emerged. In fact, several theoretical and empirical studies (*Demirgüç-Kunt and Detragiache 1998; Kaminsky and Reinhart 2000; Freixas and Holthausen 2004; Galindo and al 2009; Castiglionesi and al 2010*) have been elaborated to understand the process of international banking and financial shocks. They tackled true issue related to relationship between these shocks, on the one side, and financial integration process that are implemented by emerging and developing countries, on the other side. Their main focus is to consider that bank failures are in the center of recent economic and financial crises in emerging countries. Actually, most of the authors have come to give two explanations of banking and financial crises: on the one hand, financial liberalization make banks more vulnerable to macroeconomic shocks (*Rodrik 1998, Eichengreen 2001, Agenor 2003*) and, on the other hand, financial fragility of the banks would be exacerbated by the inadequacy of public policies and the insufficiency of supervision mechanism (*Hernández and Schmidt-Hebbel 2001, Buiter and Taci 2003, Caballero and al 2009*).

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From this perspective, the effects of financial integration on financial instability in emerging and developing economies have been largely analyzed in the literature (*Hernández and Schmidt-Hebbel 2001; Ayhan Kose and al 2003; Galindo and al 2009; Albulescu 2011; Rose 2012*). In fact, it is found that financial integration amplifies the impact of international financial shocks on aggregate credit and interest rate fluctuations (*Guillaumont and Kpodar, 2004*). The existence of some imbalances in financial systems can explain the large number of financial and banking crises in both developing and industrial countries during the last decades [Chile (1981); Mexico (1995); Southeast Asia (1997); Turkey (1994); as much as in the northern European countries at the beginning of the 90s].

In this context, the main objective of this work is to examine the link between external financial shocks, financial integration and economic growth in Maghreb countries (that have implemented structural liberalization policies and modernized banking and financial regulations in order to strengthen their financial systems) by addressing the following issue: *what are the effects of international financial shocks on financial integration project and economic growth in Maghreb countries?* Our empirical investigation is based upon studies undertaken by *Khan and Senhadji 2000, Seleteng 2006, Brezigar-Masten and al 2010*, *Adler and Tovar 2012*, and using a VAR model estimation during the period 1990Q1-2010Q4, we find that external shocks affect negatively Maghreb countries and impede the implementation of financial integration project.

This paper is organized as follows. The first section presents a selective survey of the literature on the link between financial integration and external shocks. Thereafter, the second section outlines the benefits and costs of financial integration process the Maghreb countries. Then, section 3 highlights the characteristics of financial systems and financial integration project in Maghreb economies. Section 4 describes the data and the estimation methodology. Finally, section 5 presents the empirical results.

2 LITERATURE REVIEW

Over the past two decades, there has been an increased awareness on the study of: (i) the effects that external shocks[1] can have on country's economic growth and financial integration process, (ii) the manner through which a fragile or irrational financial sector can be exposed to external shocks and affect the real economy of a country, and (iii) the degree according to which shocks occurring in the financial system can spread to other financial systems and destabilize the links between financial systems of different countries. In other words, increased attention has been focused recently on the growing frequency of financial shocks and the possible role that capital account liberalization might play in contributing to such phenomena. A variety of factors can lead to the emergence of a financial crisis in a specific country. In a world of growing financial globalization and more open capital accounts, events in other countries may have an impact on a country's financial integration and stability.

Since the pioneering contributions of Mundell's (1961) and McKinnon's (1963), much of the literature has focused on relationship between the countries that would impinge on the benefits of adopting a common currency and economic integration[2]. It is generally accepted that the correlation of shocks is the crucial criterion in a country's decision to join a commercial, financial, and currency union. *Mundell (1961)* argues that countries facing positively correlated economic shocks will be better suited for a currency union because they would allow the use of union-wide policies to correct any imbalances. In addition, the imbalances experienced by different countries during the currency and banking crises of the 1990s contributed significantly to the emergence of the idea that capital account liberalization increases the risk of financial instability [1]. In fact, the financial crisis literature tests whether financial liberalization and integration increase the risk of financial shocks. To investigate the dynamic effect of external financial shocks, several studies have used econometric models, in particular VAR models, to decompose the direct effects of external shocks on several macroeconomic variables, especially from those generated by the endogenous monetary policy response as in *Hamilton (1983)* [2]; *Bernanke et al. (1997)* [3], among others. In this context, the empirical works elaborated by *Demirgüç-Kunt et Detragiache (1998)* [4], *Kaminsky et Reinhart (1999)* [5], et *Glick et Hutchinson (1999)* [6] find that the propensity to banking and currency crises increases in the aftermath of financial liberalization. In other words, the development and widespread liberalization of financial markets in the 1980s has resulted in increasing integration. However, researches indicate that the increasing economic and financial integration can lead to a global crisis in international financial system.

[1] *The external shocks include the trade shocks, the financial external shocks, and the monetary external shocks.*

[2] *The potential benefits are: the degree of labor mobility; the extent of intra-trade; the symmetry of shocks across countries; and the system of risk-sharing.*

Furthermore, the focus on external shocks of emerging countries is understandable given their structural characteristics, particularly their trade and financial openness and their rising effort in coordination and policy harmonization on a regional scale. Indeed, investigating the responses to these shocks can give an additional indication on the homogeneity degree between the area's countries and on the convergence process of their policies. In the literature, several methods have been used in order to assess the relationship between external shocks, financial instability, capital account openness, and monetary and financial integration. Some papers have used the structural vector autoregression (VAR) models to identify the nature and the impact of external shocks on emerging and developing economies. *Ng T., (2002)* analyses three shocks in a tridimensional VAR for five Southeast Asian countries over the period 1970-1995. The identified shocks are the following: external, domestic (supply-related) and domestic (demand-related) shocks. The external shock is considered as a simultaneous combination of supply and demand external shocks. The results of this study show a strong correlation of responses to these shocks - including the external one suggesting that these countries are suitable for a monetary union [7].

In addition, the study of *Illing M. (2003)* provides four case studies of episodes often thought of as periods of financial stress or crisis [the stock market crash of October 1987, the near-collapse of Long-Term Capital Management in 1998, the failures of the Canadian Commercial Bank (CCB) and Northland Bank in 1985, and the Bank of New York's 1985 computer problem].In this study, Illing provides concrete illustrations and interesting examples of the variety of shocks that can trigger episodes of stress in the financial system. These include external shocks, operational problems, and, in the case of the stock market crash, a shift in expectations. The case studies also illustrate the kinds of contagion mechanisms that can turn isolated events into more widespread stress on the financial system. For example, the potential wealth effects associated with a stock market crash can affect consumption and investment expenditures, and the informational contagion that occurred with the failures of CCB and Northland Bank led to a number of other small banks being shut out of wholesale markets [8]. On the other side*, Aghion, Bacchetta, and Banerjee (2004)* have studied the role of financial factors as a source of instability in small open economies. To do this, they use a tradeable good produced with internationally mobile capital and a country specific factor; this model examines also the effects of financial liberalization on the stability of the macroeconomy, and assesses the macroeconomic effects of specific shocks to the financial sectors (such as over lending by banks leading to bank failures). Results show that temporary external shocks will have large and persistent effects in the sense that these economies can exhibit stable limit cycles. They show also that, in the case of small open economies, full financial liberalization (i.e., opening the domestic market to foreign capital flows) may actually destabilize the economy, inducing chronic phases of growth with capital inflows followed by collapse with capital flows [9]. This can negatively affect and hamper any economic, financial, or monetary integration projects among States. So, economies at an intermediate stage of financial development should consider carefully how they liberalize their capital account.

Similar to Ng T., (2002) study's, *Huang and Guo (2006)* have studied the case of East Asian economies, over the period 1970-2002, to estimate a multivariate structural VAR including a global external shock modeled as a global supply shock. These authors find that external disturbances are not only significant, but they are also positively correlated among East Asian countries suggesting their symmetric nature [10]. Moreover, there is strong evidence that the world economies have become more integrated globally over the last thirty years [11]. Actually, financial integration[3] has been the subject of much debate, particularly following the different shocks and crises in emerging markets in the late 1990s. Much of the debate has focused on identifying the advantages and disadvantages of the capital account liberalization policies. In fact, the severe financial crises that hit emerging countries led to a rethinking of financial integration strategies. The global financial crisis of 2007, which began with financial market problems in the United States, raised similar questions about desired integration levels in a context of repeated international financial instability; this crisis is often seen as related to the global imbalances these last years.

In reality, although capital account liberalization seems to have brought several benefits to those who have applied these policies, as evidenced by large expansionary cycles during the mid-2000s, it has not been without costs. However, the recent study elaborated by *Rancière, Tornell and Westermann (2008)* suggests that the benefits of liberalization policies seem to outweigh the costs considering countries that have experienced occasional financial crises have, on average, grown faster than countries with stable financial conditions, which suggests the existence of a positive effect of economic and financial integration with systemic risk to economic growth [12]. The study of *Edwards S. (2009)* investigates the way in which the interaction between trade and financial openness affect the probability of external crises; in other words, this study

[3] *The most important aspect of this financial integration is that global economies show co-movements in most of the economic variables (such as inflation, unemployment, GDP growth).*

examines whether an increase in the degree of financial openness affects the likelihood that a country experiences an external crisis. Using a large cross country data set (several advanced and developing countries over the period 1970-2004) and panel probit analysis, the estimation results indicate that relaxing capital controls increases the likelihood of a country experiencing a sudden stop[4]. Moreover, the results suggest that financial liberalization strategies increase the degree of vulnerability to external crises [13]. This is particularly the case if this strategy is pursued with pegged exchange rates and if it results in large current account imbalances.

Overall, financial integration allows banks in different countries to smooth local liquidity shocks by borrowing on the international interbank market. In the view of some economists *(Galindo and al 2009)*, the propagation of the crisis from developed countries to emerging and developing market economies through financial channels is proof of the need to impose limits to financial integration [14]. In this perspective, *Ersel H. (2010)* affirms that an external financial shock, such as the 2007, not only affects the financial sector of a country but can easily spread to the real sector as well [15]. Indeed, the financial crisis of 2007 led to a sharp decline in the international financial flows, which inevitably, affected the behavior of the financial institutions as well as the levels of economic growth in developing economies; these countries have become more vulnerable to external financial shocks. Moreover, emerging market economies continue to be vulnerable to large global financial shocks, as made evident by the behavior of capital flows in and out of these economies during periods of global financial stress. On the one hand, a country's *degree of financial integration* with the rest of the world is likely to influence its vulnerability to external financial shocks. On the other hand, a country's *strength of economic fundamentals* is also likely to buffer or amplify the impact of external shocks. Strong fundamentals can prevent capital outflows in the first place (as investors would be less concerned about credit worthiness) but can also play a role in allowing the economy to adjust more easily to a given shock (for example, by providing more room to undertake countercyclical policies -e.g. lowering interest rates- , letting the exchange rate depreciate or using fiscal policy to stabilize domestic demand).

In the other hand, *Dincer, Kandil, and Trabelsi (2011)* have focused, in their work, on the Turkish experience of capital account liberalization and its effect on domestic macroeconomic variables (real interest rates, real effective exchange rates, real GDP, the inflation rate and crises dummies), using quarterly data in a multivariate autoregressive vector (VAR) model during the period 1989-2009. The proposed methodology analyzes the dynamics of the interaction between capital flows and macroeconomic performance and provides the necessary evidence to study the macroeconomic effects of capital account liberalization. Estimation results find that the effects of capital flows on the economy are significantly different before and after the crisis in 2001. Indeed, the evidence supports significant effects of freeing financial flows on macroeconomic performance especially during the pre-crisis period. However, after the financial crisis of 2001, the Turkish economic growth has declined significantly [16]. Thus domestic and external financial shocks affect negatively capital account liberalization and the domestic macroeconomic variables. Furthermore, the study of *Allegret and Benkhodja (2011)* investigates the dynamic effect of four external shocks (oil price shock, USD/EUR exchange rate shock, international inflation shock and international interest rate shock) on an oil exporting economy. The authors examine also the appropriate monetary policy strategy for Algerian economy, given its structural characteristics and the pattern of the external shocks. Using the Bayesian approach, a DSGE (Dynamic, Stochastic, General equilibrium) model based on the features of the Algerian economy, over the period 1990Q1-2010Q4, the main findings of this study confirm that Algeria is especially sensitive to real shocks. Thus, external shocks in both oil and non-oil sectors are the predominant source of macroeconomic fluctuations [17].

In the same perspective, *Adler and Tovar (2012)*, asserted in their study -relating to the identification of the economic impact of global financial shocks on emerging market economies- that, in emerging Europe, the financial integration process has moved in the direction of making the region more vulnerable to global external financial shocks [18]. From these results, we can say that these shocks are harmful for any financial and economic integration project among countries. This process can play an important role to propagate the shocks to other countries [19]; it is considered as a channel through which external financial shocks lead to decline financial and intermediation costs and to negatively affect financial markets. Indeed, the crisis demonstrated that a highly integrated and developed financial system does not always and necessarily strengthen financial stability. In turn, the study of *Allegret and al. (2012)* examines the effect and the relative importance of external shocks in domestic fluctuations of East Asian countries and check if these shocks lead to asymmetric or symmetric reactions

[4] The author has defined a "sudden stop" episode as an abrupt and major reduction in net capital inflows to a country that had been receiving large volumes of foreign capital.

between the considered economies. The authors estimate a structural VAR model[5] with block exogeneity (SVARX model) over the period 1990-2010. Result estimation shows the existence of a rising impact of external shocks on domestic variables since 1990s in East Asian countries. Moreover, responses of domestic variables to external monetary and financial shocks are less symmetric, thus justifying the reinforcement of monetary and financial cooperation between the area's countries [20].

3 BENEFITS AND COSTS OF FINANCIAL INTEGRATION IN MAGHREB COUNTRIES

In the real world, a duality of benefits and risks is inescapable because of the existence of asymmetric information and imperfect contract enforcement problems [21]. The analysis of the "costs-benefits" of financial integration is highly conditional on the nature and credibility of the exchange rate regime. The sequencing and coordination of capital account liberalization, the macroeconomic stabilization and the structural reforms, aimed at strengthening the domestic financial sector, are the key elements of this analysis [22]. At the theoretical level, there are two contrasting views of financial integration effects. In one view, this later strengthens financial development and contributes to higher long-run growth. In another view, capital account liberalization induces excessive risk-taking, increases macroeconomic volatility, and leads to more frequent crises.

3.1 POTENTIAL BENEFITS

According to the analytical arguments pertaining to capital account openness and financial integration, there are a number of benefits of financial integration process [23]: the benefits of international risk sharing for consumption smoothing; the positive impact of capital flows on domestic investment and growth; the enhancement of the macroeconomic discipline[6]; and the increased efficiency as well as the greater stability of the domestic financial system associated with foreign bank penetration[7].

For the case of Maghreb countries, greater financial integration and regional trade will have positive repercussions for each country. It would allow them to create a large regional market and attract more foreign investment. In addition, it is mainly the new complementary economic structures which can multiply the possibilities of exchange whose would benefit all Maghreb countries. All these developments are conditioned by the establishment of common rules in the banking and fiscal fields and the liberalization of capital movements. At the same time, given the need to create a regional economic grouping as well as a profitable regional cooperation, it becomes increasingly imperative for the Maghreb countries to coordinate their economic, institutional and legal reforms. The concretization of financial integration among them might mean some "4.6 billion $" as an annual gain [24].

Furthermore, the financial openness process and the concretization of financial integration project in the Maghreb countries, as for other African countries, can yield benefits via three channels. First, it provides a powerful incentive for domestic financial reforms. Second, it increases the efficiency and profitability of the financial institutions by increasing their scale of operations. Third, it ensures the growth of indigenous financial institutions into regional and global players by increasing their competitiveness in the area of globalization [25]. Indeed, *Hufbauer and Claire (2008)* estimated some of the gains of the Arab Maghreb Union (AMU) by comparing selected indicators of economic performance between 1989 -the year of the AMU's inception- and 2007. Their findings include: (i) a reduction in inflation rates, except in Libya; (ii) a 30 percent increase in real per-capita GDP; (iii) an increase in the share of total merchandise in GDP from 41.7 percent in 1989 to 72.5 percent in 2007; and (iv) an increase in inward FDI stock as a share of GDP by more than 100 percent between 1990 and 2006 [26].

[5] *As an alternative to VAR approach, many researchers (Jensen and Johnson 1995; Thorbecke 1997; Bomfim 2003; Bernanke and Kuttner 2005; Dedola and Lippi 2005…) have performed event studies, which allows for analysis, comparatively at higher frequency than VAR literature which is normally based on quarterly and monthly data… For more information, see: Kazi I., A., Wagan H., and Akbar F. (2012).*

[6] *The free movements of capital flows across borders may induce countries to follow more disciplined macroeconomic policies and thus reduce the frequency of policy mistakes… See Obstfeld (1998).*

[7] *In this concept, Caprio and Honohan (1999) have argued that foreign bank penetration may: (i) improve the quality and availability of financial services in domestic market, by increasing the degree of bank competition; (ii) serve to stimulate the development of the domestic bank supervisory and legal framework; (iii) enhance a country's access to international capital; and (iv) contribute to the stability of the domestic financial system.*

3.2 POTENTIAL COSTS

However, the experience of the past two decades has led economists and policymakers to recognize that, in addition to the potential benefits discussed above, open financial markets may also generate significant costs. Such potential costs include [27]: the high degree of capital flows concentration and the lack of access to financing for small countries; the inadequate domestic allocation of these flows, which may hamper their growth effects and exacerbate preexisting domestic distortions; the loss of macroeconomic stability; the pro-cyclical nature of short-term capital flows and the risk of abrupt reversals; the high degree of volatility of capital flows, which relates in part to herding and contagion effects; and risks associated with foreign bank penetration.

In general, both domestic and external financial liberalization policies in several advanced and emerging countries has increased their vulnerability to financial shocks; these policies appear to have been associated with costly financial shocks, as documented by *Williamson and Mahar (1998),* [28]. This association may be somewhat deceptive, given that financial crises are complex events with multiple causes and have occurred in more, as well as in less, liberalized financial systems. Still, there have been enough cases where financial liberalization, including capital account liberalization, has played a significant role in crises to raise serious questions about whether and under what conditions such liberalization will be beneficial rather than harmful [29]. Although misaligned fundamentals of some sort played a role in all of the above crises, they have called attention to the inherent instability of financial markets and the risks that cross-border financial transactions can pose for countries with relatively fragile financial systems and weak regulatory and supervision structures.

The financial integration between the Maghreb countries -in the financial, commercial and economic terms- is seen as a crucial factor for stimulating economic growth. However, the cost of non concretization of the Maghreb union may be unsustainable for these economies. In fact, the trade in each Maghreb country with the European Union represent between 60 and 70 percent of their trade rate, while the trade among the Maghreb countries represent only 2.5 percent. Therefore, the non-Maghreb is expensive for these countries [30]. Losses due to the lack of integration can reach more than 10 billion $ per year for the entire region [31]. Moreover, the weakness of exchanges between the Maghreb countries hinders their economic growth rates due in particular to the rigidity of their economic structures, customs barriers and low levels of investment.

4 OVERVIEW OF FINANCIAL SYSTEMS AND FINANCIAL INTEGRATION PROJECT IN MAGHREB COUNTRIES

The financial sector plays a crucial role in the process of capital accumulation and productivity growth. In recent years, Maghreb countries are well aware of the importance of modernizing their financial sectors and have been implementing reforms, with encouraging results. These countries have established a council to coordinate and harmonize their development plans as well as interregional trade. The five Maghreb countries (Algeria, Libya, Mauritania, Morocco, and Tunisia) signed a treaty in 1988 with the objective of safeguarding the region's economic interests, fostering and promoting economic cooperation, and intensifying mutual commercial exchanges as a precursor for integration and the creation of a North African Common Market [32]. The main characteristics of the financial systems in these countries include the following [33]: (a) bank dominance and heavy public sector presence in most countries; (b) limited financial sector openness; (c) public banks burdened with inefficiencies and a high level of nonperforming loans; (d) shortcomings in the legal, regulatory, and supervisory frameworks; and (e) a largely cash-based payment systems that is being modernized.

As shown in figure 1, the aggregate of growth performance conceals important differences between the five countries, reflecting not only differences in initial economic, social, and political conditions but also differences in pace and strength of economic reform [34]. Thus, countries that have implemented deeper and broader structural reforms have reaped the highest growth dividend.

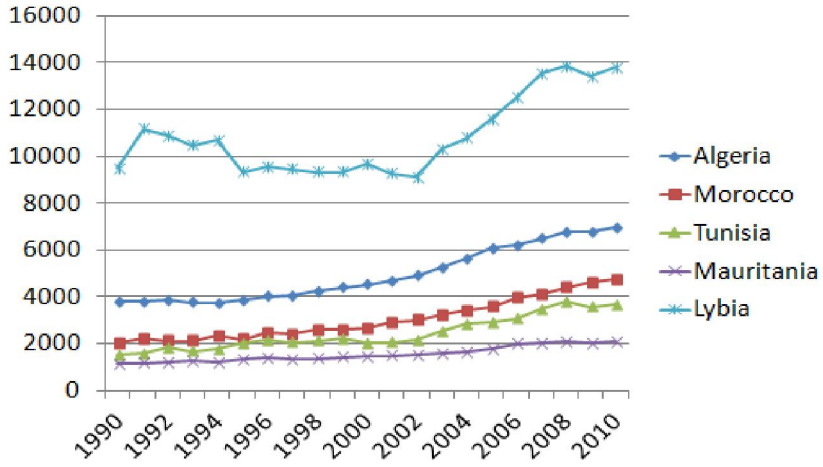


Fig. 1. GDP per capita in PPP terms (Intra-Maghreb Comparison)

Source : The International Monetary Fund, World Economic Outlook Database, April 2011.

In addition, in terms of international comparison, figure 2 shows that the growth dividend has been relatively modest: growth in GDP per capita in purchasing power parity (PPP) terms in the North African countries has accelerated somewhat during the past decade but it has been weaker than in some other developing and emerging market economies (ex: Latin American economies). So, despite the establishment of the Arab Maghreb Union over two decades ago, the bulk of the Maghreb's trade is with Europe. The level of intra-Maghreb trade is lower than that of many of the world's trading blocs. In 2007, intra-Maghreb trade represented less than 2 percent of the subregion's combined gross domestic product (GDP) and less than 3 percent of the subregion's total trade [35]. Some of the reasons for this low performance include high barriers to trade, lack of production base diversification, and political considerations.

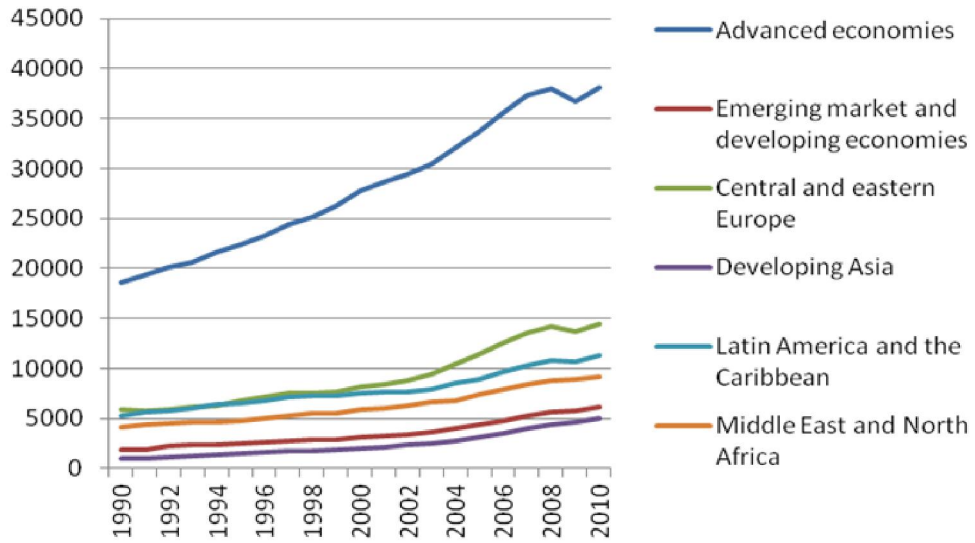
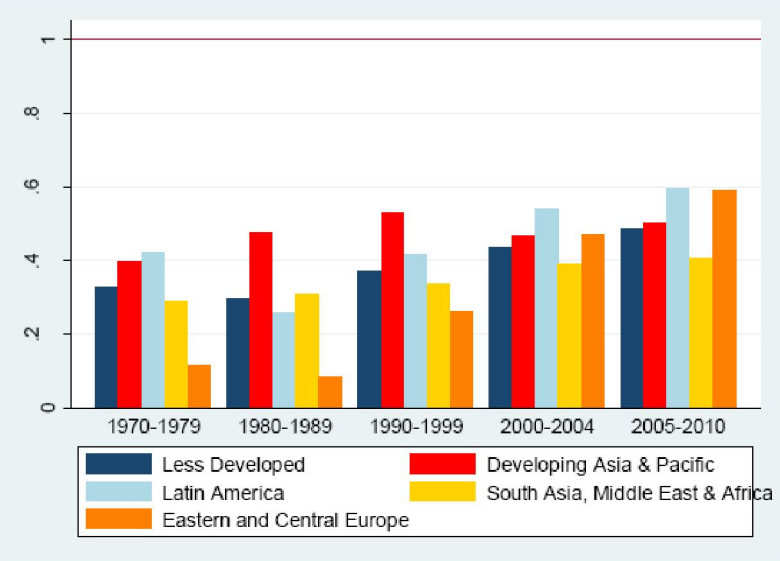


Fig. 2. GDP per capita in PPP terms (International Comparison)

Source : The International Monetary Fund, World Economic Outlook Database, October 2012.

Moreover, figure 3 presents the evolution of the financial openness index by regions. As the chart clearly shows, the Africa index of capital account openness has been increasing since the 1990s, but it has been weaker than in some other emerging market economies.



Note: The maximal value of *KAOPEN* is indexed as 1.00.

Fig. 3. Financial openness in developing countries: a comparison

Source : Ito and Chinn (2012), [36]

Financial integration is essential for the region's development, both in terms of trade and internal cooperation, and for the Maghreb's relations with its external partners, notably the European Union [37]. The Arab Maghreb Union (AMU) was founded on February 1989, when the five member states (Algeria, Libya, Morocco, Mauritania, and Tunisia) signed the constituting treaty. This treaty has the following objectives [38]: (i) progressive implementation of free movement of capital, services, goods and persons between member states; (ii) adoption of a common policy in economic, industrial, financial, agricultural, and commercial terms; (iii) establishment of a free trade area with the dismantling of all trade tariff and non tariff barriers among member countries; (iv) creation of a unified custom space with the adoption of a common external tariff with other countries; and (v) strengthening the economic partnership in the Maghreb. Indeed, to strengthen monetary and financial linkages between the five member states, several multilateral trade and financial agreements have been signed on issues relative mainly to regional trade and tariffs, investment guarantees, tax provisions, interbank relationships, and financial settlements (see appendix, figure A-1). Also, Maghreb region needs to develop a strong institutional framework and make additional progress on trade liberalization and facilitation to foster integration.

Finally, we can say that the economic reforms that have been undertaken in all Maghreb countries over the past two decades have generally achieved macroeconomic stability and contributed to raising growth in some countries. Despite these developments, financial sectors of these countries still need further modernization and regional and global integration. Some of the necessary reforms would also facilitate financial integration in the region [39]: (i) strengthen the soundness of the banking systems in all the five countries, (ii) increase competition in the banking systems, (iii) deepen the financial markets, (iv) strengthen financial sector oversight, and (v) upgrade financial sector infrastructure.

The remainder of the paper is organized as follows. Section 4 shows the empirical analysis on the effects of external shocks on financial integration project in Maghreb countries. The first part of this section descries the data and the econometric methodology; while the second part presents the model of this study. Section 5 gives the empirical results.

5 EMPIRICAL INVESTIGATION

5.1 METHODOLOGY AND DATA

5.1.1 DESCRIPTIVE DATA

To examine the effects of external shocks on financial integration project in the Maghreb countries (Algeria, Tunisia, and Morocco), we use a quarterly data[8] from the period 1990Q1-2010Q4. The data utilized for the analysis have been collected from a various international databases: the World Development Indicators (World Bank), Lane and Milesi-Ferretti (2007) database, the CNUCED, the UNCTAD stat, the SESRIC BASEIND (Basic Social and Economic Indicators) Database 2012, the Chinn-Ito index (2010)[9], and the World Economic Outlook Database (IMF), 2012. The exact source for each variable is presented in Appendix (table A-1).

Data unavailability is the main concern in carrying out the research of this nature in most developing countries. The Maghreb countries are therefore not an exception. The annual time series in these countries is not long enough to carry out a robust and sensible econometric analysis. The data for most of the variables listed below is on annual basis. Consequently, in order to have a longer time series data, Eviews software was used in order to carry out a cubic interpolation of the quarterly time series. However, the methodological technicalities and underpinnings behind this technique adopted are beyond the scope of this paper.

5.1.2 ESTIMATION METHODOLGY

Most of the studies mentioned in the literature review applied constant parameters VAR and factor augmented VAR approaches. One of the first empirical papers dealing with the issue of macroeconomic disturbances through econometric estimations is done by *Bayoumi and Eichengreen (1992)*, [40]. In that seminal paper, they apply a variant of the VAR model to assess the nature of macroeconomic disturbances among different groups of countries. This model is estimated for decomposing permanent and temporary shocks of variables.

The VAR is a technique that enables one to perform variance decomposition and examine the symmetry in each country's response to external shocks; in other words, it allows us to observe how an unexpected change (shock) in one variable affects other variables in the model. The regression estimation using the VAR technique requires for testing the stationarity of the variables as well as the cointegration relationships. In fact, Maddala and Kim (1998) indicate that in the cases where the variables are neither stationary nor cointegrated, the VAR model must be estimated using the first differences. However, if there are *r* cointegration relationships, the model must be estimated with *r* stationary combinations and *(n-r)* variables of first differences [41]. Before implementing the VAR model, it is necessary to check whether the variables are stationary. We employ the ADF test [42] and the PP test [43]. The PP test corrects, in a non-parametric way, the possible presence of autocorrelation in the standard ADF test. Then, we use the Johansen Cointegration test to examine the long-run equilibrium relationship among variables.

5.2 REGRESSION SPECIFICATION

From the examination of theoretical and empirical literature review, aimed to study the effect of external financial shocks on financial integration and growth, we specify the model of our study. Based on two endogenous variables (namely Y_1 and Y_2) and multivariate exogenous variables (control variables), the basic VAR model has the following general equation:

[8] *The data was converted from annual to quarterly time-series by applying cubic interpolation technique embedded in Eviews econometric software.*

[9] *The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness. This index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.*

$$Y_{1_t} = \alpha_1 + \sum_{j=1}^{k} \beta_{1J} Y_{1_{t-j}} + \sum_{j=1}^{k} \delta_{1j} Y_{2_{t-j}} + \sum_{k=1}^{k} \gamma_{1k} X_k + \mu_{1_t} \cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

$$Y_{2_t} = \alpha_2 + \sum_{j=1}^{k} \beta_{2j} Y_{1_{t-j}} + \sum_{j=1}^{k} \delta_{2j} Y_{2_{t-j}} + \sum_{k=1}^{k} \gamma_{2k} X_k + \mu_{2_t} \cdots\cdots\cdots\cdots\cdots\cdots \quad (2)$$

Where $Y_{t-j} = (Y_1, Y_2)_{t-j}$ is the j^{th} lagged variable of $(Y_1, Y_2)_t$ and X_k is the k^{th} exogenous variable, and it is assumed that each of the error terms does not have serial correlations or autocorrelations. In general, these assumptions could be accepted because the model has been using the lagged dependent variables.

The econometric model[10] of this study is based upon studies undertaken by *Khan and Senhadji 2000, Seleteng 2006, Brezigar-Masten and al 2010*, *Adler and Tovar 2012*, it is as follow:

$$FI_{it} = \alpha_1 + \beta_1 FI_{it-1} + \lambda_1 GDP_{it-1} + \delta_1 FDev_{it} + \gamma_1 Dshocks_{it} + \varphi_1 FDev_{it} \times Dshocks_{it} + \theta_1 X_{it} + \mu_{1it} \cdots (1')$$

$$GDP_{it} = \alpha_2 + \beta_2 GDP_{it-1} + \lambda_2 FI_{it-1} + \delta_2 FDev_{it} + \gamma_2 Dshocks_{it} + \varphi_2 FDev_{it} \times Dshocks_{it} + \theta_2 X_{it} + \mu_{2it} \cdots (2')$$

Where $FI_{i,t}$ denotes financial integration measured by the sum of net foreign assets[11] and external liabilities[12] as a percentage of GDP as indicated in *Lane and Milesi-Ferretti (2007)*, [44]. GDP_{it} variable represents the logarithmic of growth in real GDP per capita for countries. $FDev_{it}$ is a measure of the development of domestic financial systems; it is calculated by the money supply as a share of per capita GDP. $Dshochs_{it}$ is a dummy variable of external shocks taking on a value of one if country i experiences a financial disturbances in period t and zero otherwise. $X_{i,t}$ is a vector of control variable (country fundamentals and other variables); it contains $FDI_{i,t}$ that represents Foreign Direct Investment, $TO_{i,t}$ variable which represents the Trade Openness measured by imports and exports in percentage of GDP, $ExRate_{i,t}$ denotes the exchange rate variable calculated from nominal exchange rates and CPIs, $Inf_{i,t}$ that represents the annual rate of change of the Consumer Price Index, $Kaopen_{i,t}$ variable that measures the extent of openness in capital account transactions. $\mu_{i,t}$ is the error term.

6 EMPIRICAL RESULTS

6.1 STATTIONARITY AND COINTEGRATION TESTS RESULTS

6.1.1 STATIONARITY TEST RESULTS

Table 1 provides the results of the Augmented-Dickey-Fuller (ADF) and Phillips-Perron (PP) tests of the variables. The results of the unit root tests conducted on the exogenous and endogenous variables reveal that the financial integration variable, the natural logs of real per capita growth, foreign direct investment, inflation, *D*shocks, trade openness, nominal effective exchange rate, and kaopen are not all stationary in the same order (in the 1st differences).

[10] The variables were transformed into logarithm form due to the following advantages as suggested by Seleteng (2006): (i) the log transformation provide the best fit. That is to say, the log transformation also, to some extent, smoothes time trend in the dataset; (ii) the log transformation can be justified by the fact that its implications are more plausible than those of a linear model.

[11] Net Foreign Assets (NFA) = Total Assets - Total Liabilities

[12] External liabilities are measured by the sum of portfolio liabilities and FDI liabilities as a share of total liabilities.

Table 1. Unit Root Test Results

Variables in 1st Differences	Algeria		Morocco		Tunisia	
	ADF Test	PP Test	ADF Test	PP Test	ADF Test	PP Test
Y_1	- 1.506	- 3.086**	- 1.841	- 3.727***	- 1.279	- 1.046
	(0.5247)	(0.0317)	(0.3582)	(0.0054)	(0.9984)	(0.7329)
Y_2	- 1.668	- 3.129**	- 2.887*	- 3.141**	- 3.345**	- 3.707***
	(0.4428)	(0.0283)	(0.0513)	(0.0275)	(0.0161)	(0.0057)
FDev	- 1.677	- 2.211	- 2.699*	- 3.429**	- 1.883	- 2.426
	(0.4383)	(0.0229)	(0.0788)	(0.0096)	(0.3382)	(0.0128)
*D*shocks	- 2.664*	- 3.733***	- 2.664*	- 3.733***	- 3.416**	- 3.733***
	(0.0851)	(0.0053)	(0.0851)	(0.0053)	(0.0132)	(0.0053)
FDI	- 2.543	- 3.281**	- 2.486	- 5.005***	- 2.786*	- 4.201***
	(0.1119)	(0.0200)	(0.1231)	(0.0001)	(0.0651)	(0.0012)
TO	- 3.463**	- 3.708***	- 1.833	- 4.126***	- 2.672*	- 3.944***
	(0.0116)	(0.0057)	(0.3618)	(0.0015)	(0.0839)	(0.0028)
Inf	- 1.176	- 3.057**	- 1.326	- 2.535	- 2.924**	- 4.459***
	(0.6783)	(0.0345)	(0.6094)	(0.0057)	(0.0472)	(0.0005)
ExRate	- 1.653**	- 4.311***	- 1.995	- 2.956**	- 2.106	- 3.403**
	(0.4505)	(0.0008)	(0.2881)	(0.0436)	(0.2427)	(0.0137)
Kaopen	- 1.677	- 2.034	- 1.820	- 2.425	- 1.316	- 2.623*
	(0.2698)	(0.0016)	(0.0041)	(0.0073)	(0.0174)	(0.0073)

Y_1: represents Financial Integration variable, Y_2: Gross Domestic Product, FDev: Financial Development measured by M2 to per capita GDP, Dshocks: Dummy variable of external shocks, FDI: Foreign Direct Investment, TO: Trade Openness, Inf: Inflation in percent change, ExRate: the variable of Exchange Rate, Kaopen: the variable measures the extent of openness in capital account transactions.
***: variable stationary at significant levels at 1%, 5%, and 10% (-3.520, -2.900, -2.587 respectively).
Values between brackets are probabilities.

6.1.2 COINTEGRATION TEST RESULTS

Table 2 presents the results of the Johansen cointegration test. It shows the existence of a cointegration relationship between the variables in all countries (Algeria, Morocco, and Tunisia).

This table shows that, in Algeria and Morocco, there is one cointegration equation at the 0.05 level based on the trace test, as well as the maximum eigenvalue test. However, in the case of Tunisia, the Trace test indicates 4 cointegrating equations at the 0.05 level and indicates two cointegrating relations in the Max-eigenvalue test at the 0.05 level.

Table 2. Johansen Cointegration Test Results

Hypotheses of cointegration equation	Algeria		Morocco		Tunisia	
	Trace Test	Max. Eigen Test	Trace Test	Max. Eigen Test	Trace Test	Max. Eigen Test
None	76.946*	39.781*	82.297*	38.305*	174.535*	79.607*
	(0.0062)	(0.0088)	(0.0036)	(0.0138)	(0.0001)	(0.0001)
At most 1	40.164	21.522	43.991	18.515	94.928*	61.205*
	(0.2167)	(0.2459)	(0.1101)	(0.4529)	(0.0002)	(0.0001)
At most 2	18.642	15.049	25.476	15.380	33.722	15.424
	(0.5188)	(0.2855)	(0.1451)	(0.2631)	(0.5171)	(0.7140)
At most 3	3.592	2.933	10.096	9.895	5.395	4.779
	(0.9336)	(0.9511)	(0.2734)	(0.2189)	(0.7655)	(0.7694)
At most 4	0.659	0.659	0.200	0.200	0.616	0.616
	(0.4168)	(0.4168)	(0.6539)	(0.6539)	(0.4325)	(0.4325)

** denotes rejection of the hypothesis at the 0.05 level.*
Values between brackets are probabilities.

Moreover, the stationarity test as well as the cointegration test results will allow us to better specify the VAR model which will be used for the estimation of the response functions of Financial Integration, real GDP, and financial system development to the external shocks (figure A-2 in appendix presents the correlations between each studied variable).

After testing the stationarity of variables using the unit root test and the cointegration approach presented in tables 1 and 2 above, this study also involves the use of impulse response functions and forecast error variance decomposition to assess the response of macroeconomic variables to an external financial shock and the proportion of the variations in the variables attributable to this shock respectively. The analysis that follows is hence preoccupied with these issues together with the standard sensitivity checks typical in most VAR based enquiries.

6.2 THE IMPORTANCE OF EXTERNAL SHOCKS IN THE VARIANCE OF DOMESSTIC VARIABLES

In order to determine the ability of external shocks (and their relative importance) to explain the variables fluctuations at different horizons, we perform a standard variance decomposition exercise for the variables contained in the VAR model. Results of this decomposition are reported in appendix (tables B-1, B-2, B-3, and B-4) for the all period sample (1970Q1-2010Q4).

Table B-1 presents the variance decomposition of the forecast error of financial integration variable. The external shocks affect the financial integration in Maghreb countries, at short-run horizon (1-4 periods), by at least 0.5 percent (2.24 percent in Algeria and 1.31 percent in Tunisia). At the long-run horizon (16-20 periods), the variance decomposition test suggests a strong increase in the impact of external shocks. In fact, we note that these shocks explain more than 20 percent of the variance in all countries. In addition, at short-run horizon, external shocks explain at least 1.88 percent of the real GDP variances in the case of Algeria, 0.2 percent for the GDP variances of Morocco, and 0.08 percent in Tunisia (Table B-2). Thus, Algeria is especially sensitive to these shocks. Indeed, external shocks tend to be increasingly persistent at long-run horizon, especially for the case of Algeria and Tunisia. Such evolutions are linked to the increase in oil exports in Algeria and the increase in the openness degree in Tunisia these last years.

Moreover, table B-3 presents the fraction of the variance of the financial development variable due to external shocks over the period 1990q1-2010q4. Results suggest that when the country's financial system is more open (or deeper), external shocks have a significant influence on the activities of these systems at long-run horizon. As indicated in table B-4, external shocks exert a stronger influence, at long-run horizon, on *fundamentals* of all studied countries than on GDP and other variables. From this perspective, the high impact of external shocks on *fundamentals* largely reflects the rising trend in the trade openness of each Maghreb country with the Europeans countries.

6.3 RESULTS OF IMPULSE RESPONSE FUNCTIONS

Dynamic responses of each studied variable to the external shocks are depicted in appendix C for the all-period sample. Tracing out the time paths of the effects of financials shocks on the set of domestic variables, impulse responses allow us to analyze not only the contemporaneous reaction to a specific shock but also the speed of adjustment of the economy. External shocks negatively affect the macroeconomic variables of developing countries that have become more vulnerable to these shocks. Many channels explain such vulnerability [45]: first of all, these countries remain dependent from economic activity in industrialized countries (*the trade channel*) and from international capital markets -including international banking activity to finance their investment (*the financial channel*). In addition, domestic prices in emerging and developing countries remain influenced by exchange rates fluctuations (*the pass-through channel*).

These channels suggest an expected negative response of GDP in the aftermath of an external shock. Our results also suggest that these shocks negatively affect the real GDP (particularly in the case of Algeria and Morocco; in Tunisia, the effect is relatively stable). This negative effect is due to the fact that the growth of the Maghreb economies is strongly linked to the outside through, in large part, oil exports of Algeria and manufacturing exports of Morocco and Tunisia. As expected, in all studied countries, these shocks may lead to negative response of economic activity in the long-run. Thus, the financial integration project among Maghreb countries is impeded in the long-run as a result of external shocks. However, in the short-run, shocks effects on financial integration appear negative in the three countries; this can be justified by the fact that responses to shocks in these countries are relatively slow.

On the other hand, the responses of financial development indicators to an external financial shock are either insignificant from a statistical standpoint in the three studied countries. This may be the consequence of poor financial openness policies applied by these countries since the 90s. In fact, this finding is accentuated in the long-run period.

Moreover, it is important to stress that responses of the most of studied variables are similar across our studied countries both in terms of contemporaneous and persistence reactions. We expect a negative response of domestic GDP to an external shock. Indeed, the high trade openness degree of Maghreb countries with European and other advanced countries makes them very sensitive to the trade channel. These results confirm the decreasing direct influence of the external shocks on fundamentals (inflation and exchange rate) in the North African countries. Finally, we can say that the negative effects of external shocks are followed by depreciation in domestic variables as well as in real GDP fluctuations. Consequently, this can be harmful to the economic activity and to the possibility of establishing a monetary, commercial, and financial union between the Maghreb countries.

Table 3. Summary Results of Recent Empirical Studies on External Shocks and Financial Integration

Studies	Countries	Period	Methods	Main results
Aghion and al. (2004)	Small open economies	/	Dynamic open economy model	The temporary external shocks will have large and persistent effects on countries' fundamentals in the sense that these economies can exhibit stable limit cycles.
Blecker (2008)	Mexico	1979-2007	DOLS Approach [13]	After three decades of liberalization policies, Mexico has become chronically dependent on external forces as the motor of its expansion and remains highly vulnerable to adverse external shocks [44].
Edwards (2009)	Six regions in the World [14]	1970-2004	Panel Probit Analysis	Financial integration strategies increase the degree of vulnerability to external crises.
Brezigar Masten, and al. (2008)	31 European Countries	1996-2004	GMM	Financial integration stimulates a steadier provision of finance through domestic financial markets also in crisis times.
Dincer, Kandil, and Trabelsi (2011)	Turkey	1989-2009 (Quarterly)	Multivariate VAR model	Domestic and external financial shocks affect negatively capital account liberalization and the domestic macroeconomic variables in Turkey.
Allegret and Benkhodja (2011)	Algeria	1990-2010 (Quarterly)	DSGE model[15]	Algeria is especially sensitive to real shocks; and external shocks in both oil and non-oil sectors are the predominant source of macroeconomic fluctuations.
Adler and Tovar (2012)	40 EME [16] and 9 small advanced economies	1990-2012	Cross-sectional Multivariate Estimation	In emerging Europe, the financial integration process has moved in the direction of making the region more vulnerable to global external financial shocks.
Kazi, Wagan, and Akbar (2012)	14 major OECD countries	1981-2010 (Quarterly)	Augmented VAR Approach	Financial integration can play an important role to propagate the shocks to other countries.
Allegret, and al. (2012)	9 East Asian countries	1990-2010 (Quarterly)	SVARX model[17]	Result shows the existence of a rising impact of external shocks on domestic variables since 1990s in East Asian countries.

Source: Elaborated by the authors.

[13] *DOLS Approach: Dynamic Ordinary Least Squares Approach*
[14] *Regions are: Industrial Countries, Latin American and Caribbean, Asia, Africa, Middle East, Eastern Europe.*
[15] *DSGE model: Dynamic, Stochastic, General equilibrium model.*
[16] *EME: Emerging Market Economies.*
[17] *SVARX model: Structural VAR Model with Block Exogeneity.*

7 CONCLUSION AND POLICY RECOMMENDATIONS

Developing economies continue to be vulnerable to large external financial shocks, as made evident by the behavior of capital flows in and out of these economies during periods of global financial stress. However, and despite its increasing degree of financial integration, such vulnerability appears to have declined over time for some emerging regions, reflecting to a large extent marked improvements in fundamentals. In fact, countries that have made improvements to the external sustainability (current account and external debt) and have applied a more flexible exchange rate have mitigated the impact of external financial shocks, especially in highly integrated economies financially. Overall, these results support the notion that financially integrated emerging economies with strong fundamentals (especially exchange rate flexibility) are better equipped to cope with external shocks, while financially integrated countries with weak fundamentals may be more affected by external shocks.

In this paper we tried to test the effects of external financial shocks on financial integration and macroeconomic variables using a VAR framework with quarterly data covering the period 1990Q1-2010Q4. The aim of this paper is to quantify the importance of external shocks in domestic and external variables fluctuations for a sample of three North African countries (Algeria, Morocco, and Tunisia). We document in addition the dynamic response of each studied variable to external financial stress in these economies. Our results on variance decompositions and impulse responses functions show that Maghreb countries appear especially sensitive to the trade and the financial channel. Moreover, responses of domestic variables to external monetary and financial shocks are more symmetric, thus justifying the non reinforcement of monetary and financial cooperation between the area's countries. Thus, external shocks affect negatively Maghreb countries and impede the implementation of financial integration project.

Finally, we can say that although the economy of each Maghreb country has achieved, these recent years, significant steps leading them to achieve higher level of economic and financial developments, it remains nevertheless that these countries should elaborate structural economic policies especially on the commercial, banking and financial plans. They must also remove all obstacles to free movements of capital, then create a common currency and establish a free trade area. This can allow these countries to increase the degree of financial integration between them, improve economic growth rates in each country, and, thereby, make them less vulnerable to different external shocks.

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APPENDIX

APPENDIX A

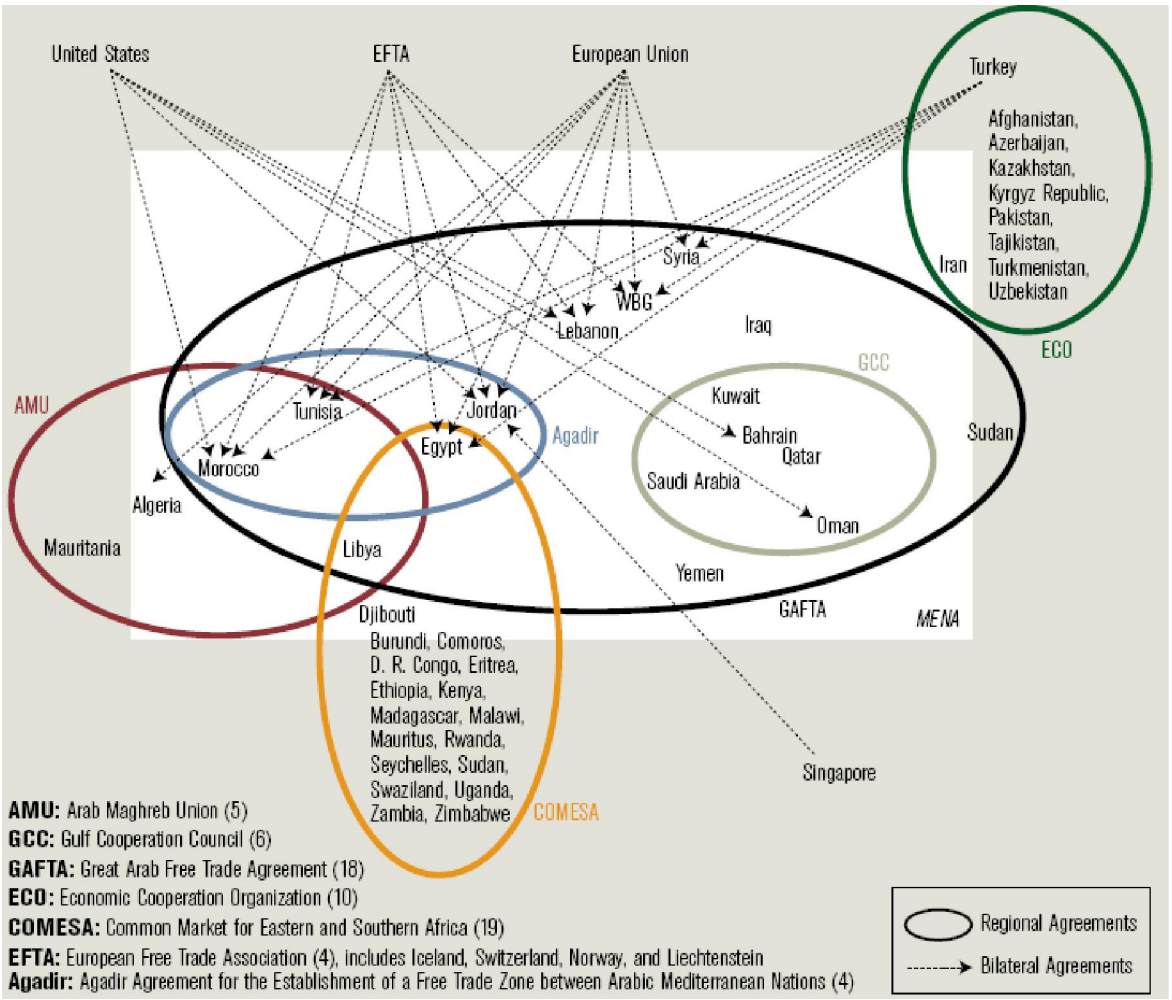


Fig A-1. The network of Trade Agreements across world regions

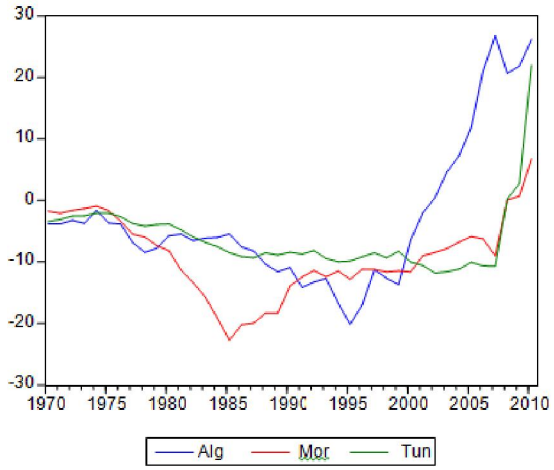
Source: World Bank Report (2009), "2008 MENA Economic Developments and Prospects".

Table A.1 Definition and sources of variables

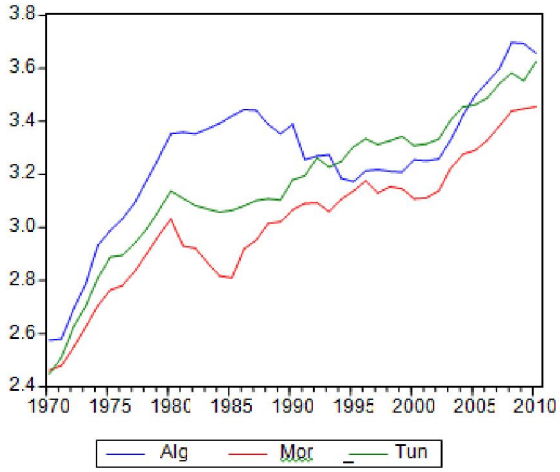
Variable	Definition	Source
FI	FI denotes financial integration measured by the sum of net foreign assets (NFA) and external liabilities (EL) as a percentage of GDP. The NFA data for the Maghreb countries are available at the Lane and Milesi-Ferretti (2007) database; and the EL data are calculated using the sum of portfolio liabilities and FDI liabilities as a share of total liabilities (available on the database mentioned above).	• Updated and extended version of Lane and Milesi-Ferretti (2007) database. • The World Bank Indicators (African Development Indicators), and authors' calculations.
GDP growth	This variable represents the growth of the real per capita gross domestic product.	• IFS; • SESRIC Database.
FDI	Direct Foreign Investment flow as % of GDP. This variable measures the inflows of capital in countries.	• CNUCED • UNCTADstat
FDev	Financial Development measured by money and quasi money (M2) as share of GDP: comprises the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This variable measures financial market development.	• International Financial Statistics (IFS). • The SESRIC BASEIND (Basic Social and Economic Indicators) Database 2012.
***D*shocks**	*D*shochs is a dummy variable of external shocks taking on a value of one if country i experiences a financial disturbances in period t and zero otherwise.	/
TO	Trade Openness (Export and import volume of goods and services) as a share of GDP. This variable measure the openness degree of domestic banking and financial system.	• The SESRIC BASEIND (Basic Social and Economic Indicators) Database 2012.
Inf	This variable measures the inflation rate in the three Maghreb Countries. It represents the annual rate of change of the Consumer Price Index.	• International Monetary Fund, World Economic Outlook Database, April 2012.
ExRate	Exrate denotes the exchange rate variable; it is calculated from nominal exchange rates and CPIs.	• IFS, Global Insight, Oxford Economic Forcasting and ERS Baseline Regional Aggregations.
Kaopen	This variable measures the extent of openness in capital account transactions.	• The Chinn-Ito index (2010 Update Version).

Fig A-2. Correlations between studied variables 1990Q1-2010Q4

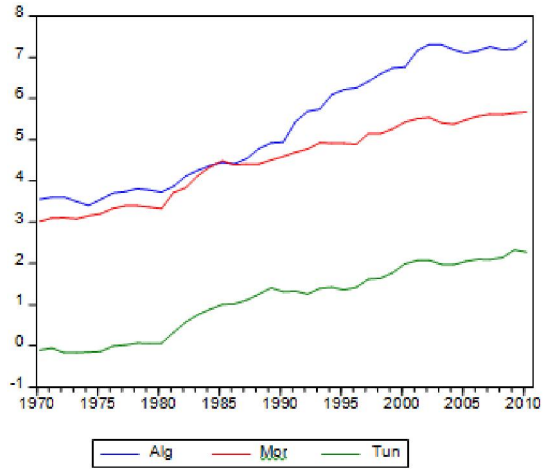
Financial Integration



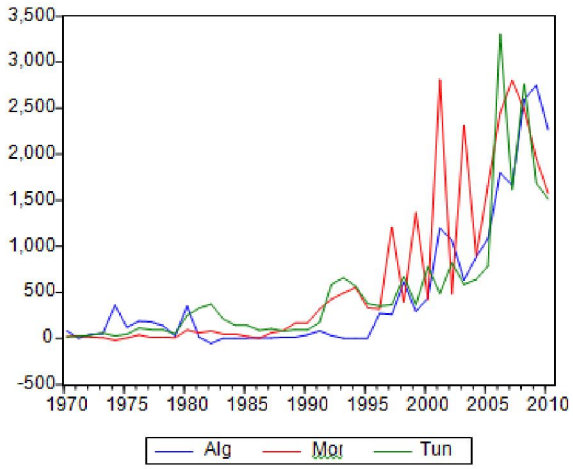
GDP growth



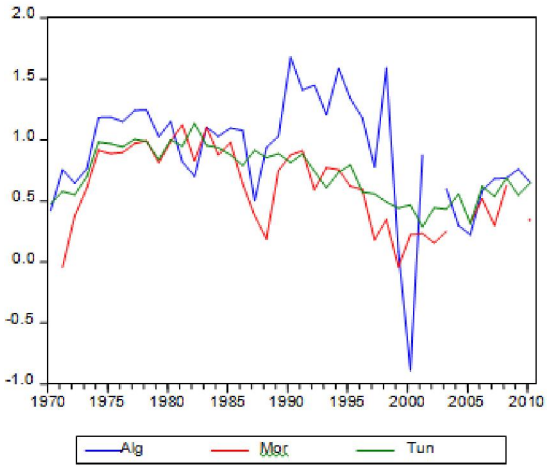
Financial Development



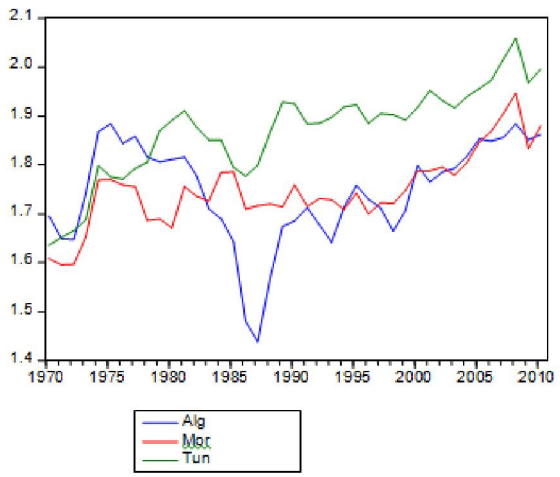
Foreign Direct Investment



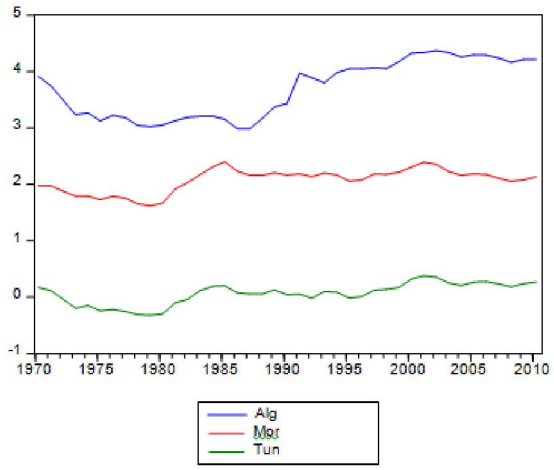
Inflation



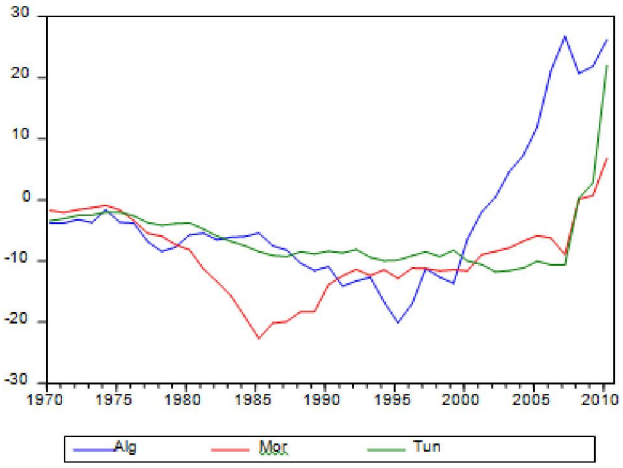
Trade Openness



Exchange Rate



Capital Account Openness



APPENDIX B. VARIANCE DECOMPOSITION

Table B-1. The fraction of the variance of the FI due to external shocks, 1990Q1-2010Q4

Variables	Horizons	Algeria	Morocco	Tunisia
External Shocks	1-4	2.24	0.65	1.31
	16-20	22.61	85.19	58.41

Notes: "1-4" stands for the average between 1 quarter after a shock and 4 quarters after a shock. "16-20" stands for the average between 16 quarters after a shock and 20 quarters after a shock.

Table B-2. The fraction of the variance of the GDP due to external shocks, 1990Q1-2010Q4

Variables	Horizons	Algeria	Morocco	Tunisia
External Shocks	1-4	1.88	0.20	0.08
	16-20	2.36	0.34	2.20

Notes: "1-4" stands for the average between 1 quarter after a shock and 4 quarters after a shock. "16-20" stands for the average between 16 quarters after a shock and 20 quarters after a shock.

Table B-3. The fraction of the variance of the FDev due to external shocks, 1990Q1-2010Q4

Variables	Horizons	Algeria	Morocco	Tunisia
External Shocks	1-4	0.21	0.01	0.04
	16-20	1.40	0.23	3.99

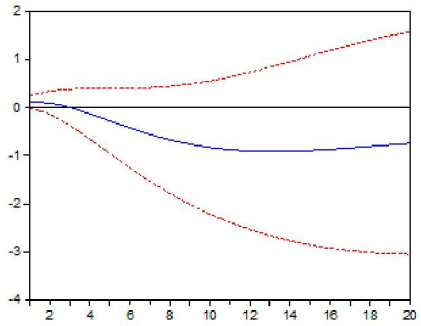
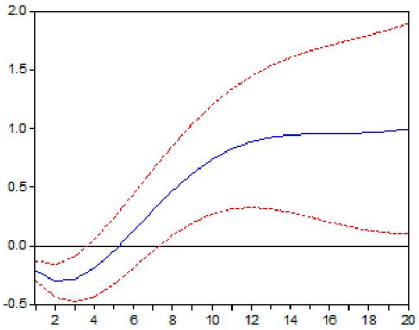
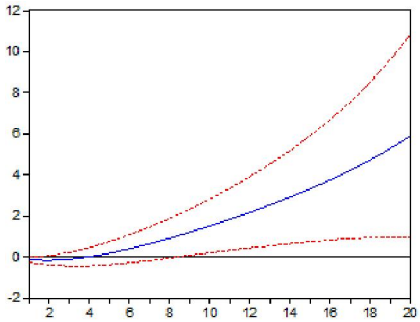
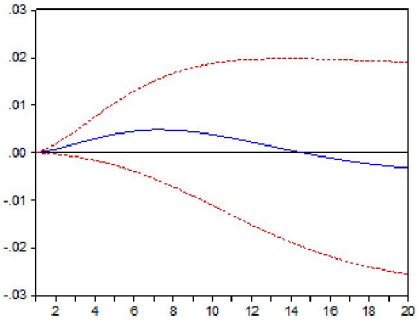
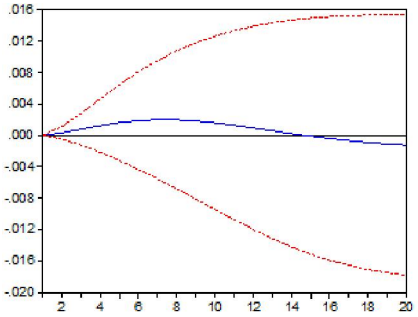
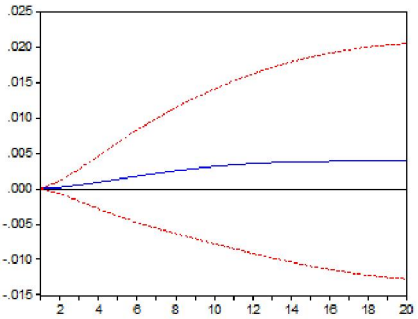
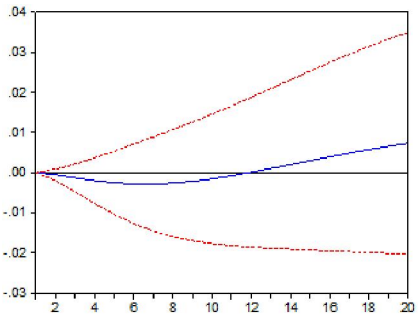
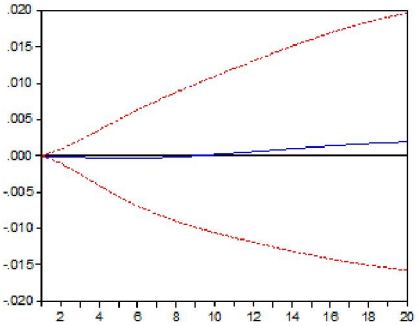
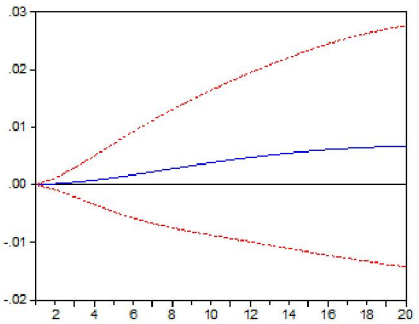
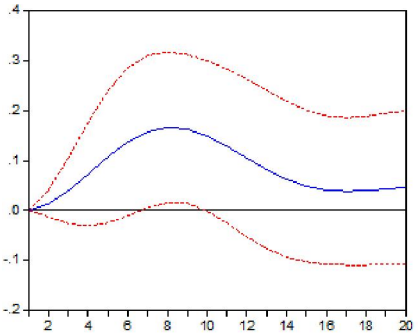
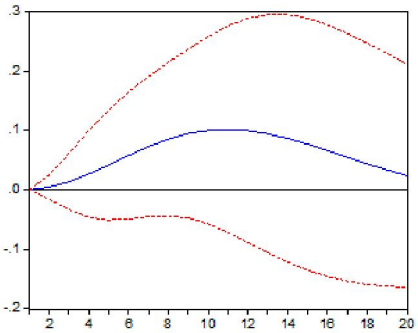
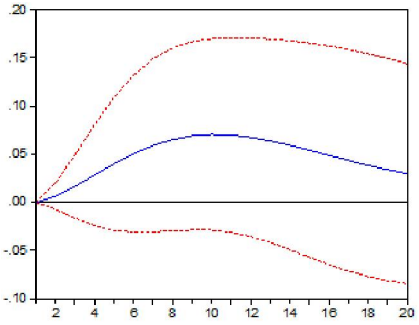
Notes: "1-4" stands for the average between 1 quarter after a shock and 4 quarters after a shock. "16-20" stands for the average between 16 quarters after a shock and 20 quarters after a shock.

Table B-4. The fraction of the variance of the Fundamentals due to external shocks, 1990Q1-2010Q4

Variables	Horizons	Algeria	Morocco	Tunisia
External Shocks	1-4	1.09	0.24	0.42
	16-20	33.74	26.79	18.84

Notes: "1-4" stands for the average between 1 quarter after a shock and 4 quarters after a shock. "16-20" stands for the average between 16 quarters after a shock and 20 quarters after a shock.

APPENDIX C. IMPULSE RESPONSE FUNCTIONS TO AN EXTERNAL SHOCK, 1990Q1-2010Q4

ALGERIA	MOROCCO	TUNISIA
Responses of FI to shocks	Responses of FI to shocks	Responses of FI to shocks
		
Responses of GDP to shocks	Responses of GDP to shocks	Responses of GDP to shocks
		
Responses of *F*Dev to shocks	Responses of *F*Dev to shocks	Responses of *F*Dev to shocks
		
Responses of *Fundamentals* to shocks	Responses of *Fundamentals* to shocks	Responses of *Fundamentals* to shocks
		

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Nigerian Engineering Students' Compliance with Workshop Safety Measures

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ABSTRACT: Proper evaluation of various risks involved in job specifications in the workshop, and appropriate implementation, and adherence to the correct safety rules by instructors and all workshop users is a determinant factor in achievement of absolute safety in the workshop. Acquaintance and compliance with the basic safety practices in engineering profession in the course of undergraduate training makes safety engineering professionals in the field. Observance of safety measures in workshop among engineering students of Federal University of Agriculture, Abeokuta was assessed using 44-item questionnaire. The questionnaire assessed the demography, housekeeping, personal protective devices, use of equipment, tools, and machineries, first aid and hygiene observation. A sample size of 195 engineering students was recruited for the study which cut across 2nd – 5th year students of the four engineering departments in the school. The responds was, civil 35 (17.9%), mechanical 64 (32.8%), electrical 51 (26.2%) and agricultural engineering students 45(23.1%). 67 (34.4%) of the participants were in 200 level, 68 (34.9%) in 300 level, 25 (12.8%) in 400 level and 35 (17.9%) in 500 level. The compliance level of engineering students of Federal University of Agriculture, Abeokuta with the workshop safety rules was above average. Therefore for good safety competence in the appropriate field of work, more attention is needed to ensure absolute control of hazards and avoidance of injury.

KEYWORDS: Student, Safety, Hazard, Engineering, Workshop.

1 INTRODUCTION

A workshop is any building principally used for manufacturing or repairing of goods [1]. Virtually every workshop contains many potential safety hazards. However, with proper control these hazards can be eliminated [2]. Engineers, in the fulfillment of their professional duties are expected among the fundamental codes spelt out by National Society of Professional Engineers to hold paramount the safety, health, and welfare of the public and perform services only in areas of their competence [3]. Generally, engineering practices expose workers to injuries in the course of execution of any project. Mishap which causes some injury to the person, damage to machines, tools and equipment, which results in loss of production, may be prevented by worker's precautions [4]. Successful safety services improve the outcome of engineering works; add quality and years to workers life and equipment lives [4].

Proper evaluation of various risks involved in job specifications in the workshop, and appropriate implementation, and adherence to the correct safety rules by instructors and all workshop users is a determinant factor in achievement of absolute safety in the workshop. For every accident that causes a major injury, there are 29 accidents that cause minor injuries and 300 accidents that cause no injuries [5]. Many accidents share common root causes, addressing more commonplace accidents that cause no injuries can prevent accidents that cause injuries. Safety conscious work environment is an important part of preventing workplace injury, violence and even fatalities [6].

Training students in the use of safety equipment, safety procedures and prevention, and encouraging them to participate in creating a safe work environment are one of the best ways to reduce accidents and injuries [6]. Acquaintance and compliance with the basic safety practices in engineering profession in the course of undergraduate training makes safety

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engineering professionals in the field. In the provision of engineering training, the fundamental knowledge, intellectual and practical skills are among the core programmes required for all engineers. This extends to developing ones skills in workshop practice and conducting ones design, make and test projects. Many outlines on safety observances at workplaces are available etc., but no research work has been done to assess the compliance level with these workshop safety measures during project works execution. This study assessed the observance of safety measures in workshop among engineering students of Nigerian.

2 MATERIALS AND METHOD

This cross-sectional survey was conducted among the 2nd – 5th year engineering students of Federal University of Agriculture Abeokuta Ogun State, Nigeria. The research was conducted towards the end of 2011/2012 academic session to ensure adequate participation of respondents in practical works. Data collection tool was a two paged, 44-itemed self-administered questionnaire with 15 minutes completion time. The questionnaire assessed the demography, housekeeping, personal protective devices, use of equipment, tools, and machineries, first aid and hygiene observation. The four questions on demography assessed department, level/class, sex, number of practical participation. Six questions assessed their personal action in keeping things in their position and ensuring neatness of the workshop. Seven questions assessed proper dressing for work. Eight questions assessed use of tools while executing jobs. Six questions assessed machine handling. Twelve questions assessed caution consciousness and four questions assessed attitude towards the use of first aid facilities and personal hygiene and safety consciousness. The questionnaire was hand delivered to 3^{rd} – 5^{th} year students and completed during students' free week, normally a week before semester examination and to 2^{nd} year students one week to the end of Students' Work Experience Programme (SWEP). Students absent from school during the period of this study were excluded. Recruitment was voluntary and no incentive was offered. Prior to participation, aim of the study was explained to the student and informed consent obtained. The results obtained were arranged in tabular forms.

3 RESULTS AND ANALYSIS

195 engineering students participated in this study comprising civil 35 (17.9%), mechanical 64 (32.8%), electrical 51 (26.2%) and agricultural engineering students 45(23.1%). Gender distribution showed that males constituted 169 (86.7%) of the respondents and the remaining 26 (13.3%) were females. 67 (34.4%) of the participants are in 200 level, 68 (34.9%) in 300 level, 25 (12.8%) in 400 level and 35 (17.9%) in 500 level. All participants have adequately participated in practical work coupled with SWEP which offered the students ample opportunity to handle different equipments, tools and machineries.

Before work commences, an assessment of the risks presented by the potential hazards of the job should be carried out. This sounds very formal, and indeed formal risk assessments are normally made by competent and suitably qualified personnel in many working environments, ranging from factories, building sites and demolition sites, to schools, hospitals, shops and even offices [7]. These assessments are then used to manage the risk and to implement health and safety measures to allow work to be carried out as safely as possible [7]. It is this that brought about, the provision of the necessary information on the general safety precaution at entrance of the workshop to be observed in order to avoid hazards. These rules are very important which if ignored accident is inevitable. The degree of safety achieved in a system depends on the emphasis given [8]. Students are always received at the entrance of the workshop by the workshop instructor who passes on some vital information to them either for a new project to be carried out or for continuation of ongoing one. Over familiarity and conversance with these instructions as they sound the same most of the time does not equal compliance. The monotonous nature of these instructions makes 33 (16.9%) of the respondents violate the rule thereby divulging themselves and fellow students to unnecessary risk. Whereas 97 (49.7%) of the respondents always and 65 (33.3%) of the respondents sometimes present themselves for the instructors directives before commencement of the day activity (Table 1).

Accidents are naturally unforeseen event or occurrence that results in death, injury, or property damage but when they happen, one can't really say they are unanticipated. Accident; be it acute or mild needs immediate attention. Attending to these challenges immediately they occur before seeking the attention of medical personnel is called first aid [1]. First-aid supplies are provided for emergency use. In some cases, people exposed to these hazards may not show signs of injury or illness for years. But later accumulate and develop to more challenging health issues. When injuries occur in the workplace, medical help are always available to resolve them. The provision of first aid is not always the problem with most workshops in institutions of higher learning, but usage especially when there is no immediate burn, pain, cut or scratch. When situation like this arises, the students continue their work without letting the instructor know about the injury. Reporting to the instructor for referral to first aid personnel is very important to the worker's life. "Life they say has no duplicate" as such the respondents do not take chance in cases of their health as 64.1% and 22.1% always and sometimes report to the instructor

for immediate treatment respectively. Only 13.8% of the respondents are wholly obdurate to the rule (Table 1). The eyes or body of technical worker may be exposed to injurious corrosive materials, which demands eye washes or any other suitable equipment for quick drenching or flushing to avoid health mutilation afterward. Contact with splashed chemical liquids, powders, dusts, fumes, mists, gases, machine lubricants, degreasers, coolants, releasing agents, paint, fuel, cleaners, metal working fluids, gels or grease used around machinery could be harmful. Most of these chemicals can burn, explode, corrode, poison, or irritate. Chemicals and chemical by-products are one of the non-mechanical hazards in workplaces which need to be treated with utmost care. Peradventure any chemicals or chemical by-products touch any part of the body the same should be washed off. Only 89 (45.6%) wash off chemicals when they drop on them whether painful, irritating or not.

Knowing the signs of possible emergencies, such as how to shut down your equipment, where to find and use the fire extinguishers or worst of all how to escape from the workshop in case of overwhelming situation is very important. Most of the mishaps that happen result in either injury, occupational illness, damage to or loss of equipment or property, or damage to the environment or even death. The risk is the likelihood of it happening. Therefore it is necessary for one to be fully acquainted with one's working place. A good number of the respondents 162 (83.1%) know the emergency exit of the school workshop.

Good lighting is essential for every workshop. Artificial light are strategically placed in the workshop over work benches. Machine tools do have supplementary lighting for good vision of the operator. There are times the weather changes and the brightness of workshop dim even at that 10.8% of respondents still manage to do something with the poor illumination (Table 1).

Engineering works need utmost carefulness and attention because of the implication of poor design and fabrication. Discussing while operating a machine is very dangerous not only to the personnel working but also to the material, machine and co workers. 89 (45.6%) of the respondents adhere to this rule (Table 1).

Table 1. Safety Consciousness/First Aid

Characteristics	Always n (%)	Sometimes n (%)	Never n (%)
Present for proper welcome instruction to the workshop	97(49.7)	65(33.3)	33(16.9)
Conversation while operating machine or working in the workshop	42(21.5)	64(32.8)	89(45.6)
Report to concerned personnel when injured for first aid	125(64.1)	43(22.1)	27(13.8)
Wash off chemicals drop on your body whether painful, irritating or not	89(45.6)	64(32.8)	42(21.5)
Knowledge of emergency exit	162(83.1)	13(6,7)	20(10.3)

Every profession has its own dress code that suits the kind of work involved. Proper dress etiquette explains vividly the understanding, one has pertaining to the duties, responsibilities, expectations and requirements in ones profession. Safety dressing is much more than just professional guise, which necessitate whether you look good or feel comfortable in your outfit. It is a conscious outfit aimed at reducing the chances of injury and safe guarding the personnel involved. Safety outfit accessories include helmet, fitted overall, safety boot, hand gloves, eye shield, muffler and nose cap [9]. Trim fitting clothing is required when doing works in workshop, especially where there is a risk of entanglement. Engineers' overalls with zipped pockets, leather footwear or boots with insulated, non-slip soles and steel toecaps are recommended. Nitrile or neoprene gloves are mandatory when handling hazardous substances. Wearing dry leather gloves and other appropriate protective clothing is a practical risk control measure that can be taken by individual worker. Helmets in good conditions are also appropriate for the process and the job, and be in good condition [9].

There are also hazards due to falling objects from work taking place at height [7]. This is protected by wearing safety boot steel toecaps. It is expected that technical or engineering personnel must have these protective devices on before entering the workshop for any technical task. Possession of these safety gadgets is a step to compliance to the rule of dressing properly. I19 (61%) of the respondents have their gadgets complete whereas 51 (26.2%) of the respondents sometimes make it up by getting from friends and 25 (12.8%) of the respondents are adamant to the rule (Table 2). 108 respondents representing 55.4% of the participants always put on all safety device before entering workshop, 53 (27.2%) does sometimes and (34) 17.4% do not (Table 2). Despite the risk and hazard involved when one is poorly dressed, only 87 (44.6%) of the respondents dress properly every time they enter the workshop because they have all the protective gadgets, whereas 65 (33.3%) and 43 (20.1%) sometimes and never dress correctly to the workshop respectively (Table 2). Having safety consciousness at the back of the mind, 111 (56.9%) of the respondents do not go the workshop except they are well dressed

for work. 60 (30.8%) sometimes does and 24 (12.3%) always make do with the available gadgets (Table 2). A rule not completely obeyed is equivalent to rule ignored. A worker putting on an overall that is loose fitted is in danger worse than one who is not putting on any protective cloth because he/she has increased the chances of being entangle to rotary part of the machine. An average number of the respondents, 102 (52.3%), have fitted overall (Table 2). Dressing properly with appropriate protective clothing is a practical risk control measure that can be taken by individual worker to reduce the chances of injury [7]. If good and appropriate equipment are available and used properly, then the risk of injury is automatically lowered. Protective equipment and clothing for the face, head, hands, arms and body are the normal risk control measures used to reduce exposure to injury especially radiation during welding processes and others in the immediate vicinity of the process being used [7].

There are many hazards which are fairly easy to be recognized and aware of, particularly some of the chemical hazards. Gases like carbon monoxide and nitrogen are colourless and odourless which make it difficult for one to sense danger when they are emitted ([7], [10]). The health effects of exposure to gases like carbon monoxide and fume include irritation of the upper respiratory tract (nose and throat), tightness in the chest, wheezing, metal fume fever, lung damage, bronchitis, pneumonia or emphysema [7]. Welding and oxyacetylene cutting processes produce high volumes of gaseous fume. These gases give great risk in breathing. Inhaling dust, spores or gases can cause serious lung injury when doing repair work ([7], [9]). In order to take care of this, it is expected that a worker put on nose cap to filter these gases. The use of respirator or nose cap is not a usual practice among the students. Only 31 (15.9%) of the respondents comply with this rule as they are seldom involved in practical that is characterized by obvious air pollutants (Table 2). This might be because there are no immediate threats witnessed. That notwithstanding it does not exterminate health challenges involved.

Usage of muffler is not found common among the students as 94 (48.2%) of the respondents has never made use of it, 44 (22.6%) of the respondents sometimes do while 57 (29.2%) of the respondents always do (Table 2). Noise is an everyday occurrence and an industrial workshop can be very noisy. Most operations in the workshop generate noise. The noise produced by various operations differs in intensity and frequency. Ancillary processes like grinding, chipping, gouging and hammering also generate varying levels of noise. Associated practices, such as crane operation and forklift truck operation, also generate noise [11]. Exposure to noise over a period of time can result in impairment or loss of hearing ([7], [10]). In traditional boiler shops where continuous riveting and hammering takes place almost every day, hearing loss is common and many platters and others became deaf after years of exposure to the noise [7]. It is also possible that permanent hearing damage can be caused by a single, intense impact noise, like an explosion. Loud impact noises can also induce tinnitus, a continuous or intermittent ringing, or other noises, in the ear [12]. Noise is fairly easy to detect but the effects can accumulate over a long period of time and so noise hazard can, surprisingly, be overlooked. Exposure to high level of noise in the workshops even for short periods can cause permanent hearing damage. Permanent damage, noise induced hearing loss, results because the nerve hairs in the ears which sense and transmit sound messages to the brain become damaged and die. When this happens the affected person mis-hears words. What does the future hold for an engineer who is to be avoided due to hard hearing? 'Impact noise' such as that caused by banging of tools can damage the eardrum or bones of the ear. The legal action level for noise is 85 dB(A) [7]. Sound levels above 85 dB, can cause damage due to sound pressure (measured in dB) and time of exposure. These effects begin to be seen with long-term daily exposure to noise levels above 65 dB or with acute exposure to noise levels above 80 to 85 dB ([13], [14]). If it is necessary to communicate by shouting at a distance of 2 meters, the noise level is likely to exceed 85 dB(A). It therefore becomes very necessary that students performing some work should put on mufflers to avoid ear damage.

Table 2. Workshop Outfit

Characteristics	Always n (%)	Sometimes n (%)	Never n (%)
Possession of complete set of protective gadgets	119(61.0)	51 (26.2)	25 (12.8)
Dress complete in safety outfit before entering workshop	108(55.4)	53 (27.2)	34(17.4)
Dress properly for work before entering the workshop	87(44.6)	65(33.3)	43(20.1
Making use of available outfit even if not complete	111(56.9)	60(30.8)	24(12.3)
Fitted overall	102(52.3)	45(23.1)	48(24.6)
Use of respirator	31(15.9)	31(15.9)	133(68.2)
Use of muffler	57(29.2)	44(22.6)	94(48.2)

The workshop should have clearly defined access areas which should be kept clear of all items and free of litters. Workshop equipment/materials should be sited in designated areas clear of access areas, generally around the periphery of

the building ([9], [15]). In the course of execution of a project so many equipments and materials are involved which are not used in the places they are kept. These equipment/materials are jumbled everywhere in the process of working but it is not expected to remain like that at the end of the working hour. Putting things in order at the end of each working hour is some sort of challenge to the engineering students. Only 90 (46.2%) of the respondents always tidy the workshop after execution of work, while 79 (40.5%) of the respondents sometimes and 26 (13.3%) never do that (Table 3). 110 (56.4%) of the respondents, always clear the bench after each work day, while 53 (27.2%) of the respondents sometimes and 32 (16.4%) never do that (Table 3). Good arrangement and placement of tools and equipment do not just show orderliness but grants easy passages through the aisle in the workshop thereby preventing avoidable injury to the personnel. 121 (62.2%) of the respondents always maintain passages free from obstruction while 54 (27.7%) and 20 (10.3%) sometimes and never do that respectively (Table 3). Untidy work areas, obstructed walkways, welding cables trailing along the floor or over fabrications, discarded items of equipment or consumable packaging present high risk of falls, trips, slips, collisions, etc., resulting in physical injury [7]. To avoid dirty in the workshop 99 respondents representing 50.8% of the study participants always make use of waste disposal bin in the workshop. Maintaining tidy workplaces, removing obstructions and discarded materials greatly reduces the risk of injury. Scraps of some materials used in the workshops are readily combustible materials like paper and cardboard [7]. These materials should not be present after working especially in the welding area. If there are no such materials in the immediate vicinity, then there should be low risk of fire. Clearing the work area of combustible materials after every work hour in the workshop reduces the risk of fire. Trash can also be from remains of edible materials. A workshop is not a refectory neither is it dinning room therefore it is not expected of any worker to eat in the workshop. Appreciable level of observance of this rule is recorded 120 (61.5%) of the respondents has never eaten in the workshop (Table 3).

Access to the workshop should be limited to persons at work [9]. It is true that there are times students are not given much time to execute their project at their own pace especially when they need regular assistance of the instructor. Students tend to congest the workshop in order to meet up with the deadline for the submission. Crowding the workshop increases the exposure of workers to injury. This demands that when the comfortable and considerable spaces are occupied it is expected that on coming students should exercise patience for there to be space. Only 47.2% of the respondents always wait when there is limited space in the workshop, while 24.1% and 28.7% of the respondents sometimes and never wait respectively for enough space before they go in for their own work (Table 3). Working in a confined space increases the risk of accidents due to contact with materials or equipment from the coworkers and the colleagues [9]. This consequently arouses some undue quarrel and unnecessary exchange of words among the students.

Table 3. House Keeping

Characteristics	Always n (%)	Sometimes n (%)	Never n (%)
Orderly arrangement equipment/material	90(46.2)	79(40.5)	26(13.3)
Clear the bench after work	110(56.4)	53(27.2)	32(16.4)
Keep passage free from obstruction	121(62.1)	54(27.7)	20(10.3)
Use of the waste disposal	99(50.8)	51(26.2)	45(23.1)
Eat in the workshop	34(17.4)	41(21.0)	120(61.5)
Exercise of patience when there is limited space in the workshop	92(47.2)	47(24.1)	56(28.7)

Availability and proper usage of appropriate equipment lowers the risk of injury to technical personnel. It is not expected that a student or any technical personnel should use any tool or equipment he/she is not conversant with. Regardless of how easy it appears to be. 54.4% of the respondents have never tried using their discretion in handling any tools or equipment, they have not been taught how to use, while 16.4% and 29.2% of the respondents always and sometimes respectively try to help themselves out, due to impatience (Table 4). A good selection of hand tools is required for every workshop. Particular care is required when handling and working with tools or machine parts with sharp edges. Such should be kept with the sharp edge covered. Some of the hand tools used in the workshop loose their handle after sometime due to age or usage, at this point it is not advisable that such tools be engaged in a technical work except if put back in order. 131 (67.2%) of the respondents always comply with this rule while 45 (23.1%) and 19 (9.7%) of the respondents sometimes and never respectively ensure that hand tools are equipped with handles (Table 4). 41 (21%) go to the extent of managing a damaged tools so long as they are still working even when they are faulty. There are situation when the desirable tools are not available, it is not expected of a trainee or a student who is still undergoing the mastering activities of engineering to improvise. This is practiced by some of these students, 44.6% of the respondents do improvise when the needed tool is delayed or not available at the time it was needed. It is the responsibility of a student working with any tools or equipment to

report mal functioning of the tools or equipment. Improper use of any tool or equipment results in usual noise. 110 (56.4%) of the respondent always report unusual signs and noise of machine to the workshop instructor whereas 50 (25.6%) and 35 (17.9%) of the respondents sometimes and never report unusual signs and noise of machine to the workshop instructor respectively (Table 4). 106 (54.4%) of the respondents report any tool damaged by them for proper documentation while 50 (25.6%) and 39 (20.0%) sometimes and never report any tool damaged by them for proper documentation to avoid the disciplinary measures respectively (Table 4).

For sustainability of the machine and the tools, a worker need to always take proper care of the tools and the equipment during and after each working hour as recommended by the producer. Taking good care of the tools and machineries improves the outcome of engineering works, add quality and years to the workers and equipment life. This ranges from usage, cleaning, lubricating if necessary to storage in the right place after use. 109 (55.9%) of the respondents always clean their tools whereas 48 (24.6%) and 38 (19.5%) of the respondents sometimes and never clean their tools respectively. 47 (24.1%) of the respondents always lubricate their tools when necessary. 73 (37.4%) and 75 (38.5%) of the respondents sometimes and never respectively observed that respectively (Table 4).

Table 4. Tool Handling

Characteristics	Always n (%)	Sometimes n (%)	Never n (%)
Use your discretion	32(16.4)	57(29.2)	106(54.4)
Ensure that your hand tools are equipped with handles	131(67.2)	45(23.1)	19(9.7)
Manage faulty tools/equipment	41(21.0)	100(51.3)	54(27.7)
Improvisation of tools when not readily available	87(44.6)	71(36.4)	37(19.0)
Report unusual signs and noise of machine	131(67.2)	46(23.6)	18(9.2)
Report damaged tool	106(54.4)	50(25.6)	39(20.0)
Clean the tools after work	109(55.9)	48(24.6)	38(19.5)
Lubricate their tools	47(24.1)	73(37.4)	75(38.5)

Manual handling of loads is either lifting, holding, lowering, pushing, pulling, carrying or moving of cylinders, tools, materials, equipment and consumables, etc. [16], [17] Either of these can present a hazard often in the form of cumulative disorders due to gradual and cumulative deterioration of the musculoskeletal system through continuous lifting/handling activities [17]. Other general sources of hazard on industrial premises include forklift trucks, mobile cranes, overhead cranes, moving machinery, site transport, delivery vehicles and so forth [7]. General safety hazards and hazards encountered during manual handling are usually easy to recognize with some training [7]. These include moving machinery, falling objects, forklift trucks, mobile cranes, overhead cranes, site transport and hazards presented during manual handling of gas cylinders, tools, materials, equipment and consumables. One of the most common injuries experienced by workers is back injury during manual handling [7]. The work area itself is likely to present a variety of safety hazards associated with access and exit points, where the work area is situated, gangways, cranes, steps, ladders, staging, scaffolding, pits, materials, tools, cables, machinery, plant and equipment, etc [7]. Moving, lifting, carrying, etc., presents a high risk of injury if the things moved are heavy, large or awkward, or not lifted, carried or moved properly. Using specialized or dedicated lifting equipment and systems reduces the risk of injury. If proper training in correct manual handling is undertaken, the risk of injury due to lifting or carrying, etc. will be reduced. Table 5 shows various manual handling operations and the level of students' compliance with them. Work-related low back pain and injuries are the most common musculoskeletal disorders caused by manual handling operations [17]. Factors that increase the risk of injury include the load being too heavy, large, difficult to grasp or unstable, the task being too strenuous or involving awkward postures or movements, and the working environment lacking sufficient space, having slippery, uneven or unstable floors, having extreme temperatures or poor lighting [17].

Table 5. Manual Handling

Characteristics	Always n (%)	Sometimes n (%)	Never n (%)
Single handedly lifted something too heavy for one person	69(35.4)	69(35.4)	57(29.2)
Use of hooks or crane to carry heavy object	57(29.2)	74(37.9)	64(32.8)
Gathering more people to lift heavy object when lifting device is not available	105(53.8)	65(33.3)	25(12.8)
Lifting an object in such a way that the weight of the object become part of your weight	67(34.4)	66(33.8)	62(31.8)
Having object lifted in static body position	50(25.6)	75(25.6)	70(35.9)
Check object for heaviness before lifting it	119(61.0)	51(26.2)	25(12.8)
Check object if well packed before lifting	132(67.7)	51(26.2)	12(6.2)
Check for proper grasp of load before lifting	134(68.7)	52(26.7)	9(4.6)
Ensuring that weight is well packed and balanced it won't move around	133(68.2)	53(27.2)	9(4.6)
Ensuring tight grip on the object before lifting	153(78.5)	32(16.4)	10(5.1)
Slow and smooth movement while picking an object	96(49.2)	78(40.0)	21(10.8)
Use a hand truck, trolley or a forklift	20(10.3)	77(39.5)	98(50.3)

4 CONCLUSION

Engineering practice has many hazards that have the potentials to cause injury or damage to health. The risk of injury or damage to health occurring depends on how hazards are dealt with or controlled. Freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment is safety. Everybody has a responsibility to work safely and not to endanger themselves or any other person at work [7]. Workers have a duty to take care of their own health and safety and those of others, and must not intentionally or recklessly interfere with or misuse anything provided for health and safety. The health safety and environment act applies to all people at work and others persons in, or in the vicinity of, a place of work whereas the establishment have a duty to provide information, instruction, training and supervision to ensure health and safety at work [7]. Although the compliance level of the engineering students was found to be 61.3% for proper dressing, 68.8% for use of first aid facilities, 60.1% for house keeping, 68.2% for tools/equipment handling and 64.5% for manual handling, adopting absolute safe work practices to avoid any form of hazard is imperative when doing all workshop works.

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Experience on domestic waste segregation in Ghana

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ABSTRACT: Pollution from domestic wastes is a major environmental challenge in Ghana and many developing countries. Most of these countries depend almost entirely on landfills for waste management, which has proved to be expensive, inefficient and unsustainable. A sustainable solution to this problem is productive use of waste such as recycling. The main challenge that may limit recycling in Ghana and some of these countries is that a chunk of the wastes are littered on the environment, and the rest is collected in bulk in the same waste bin, thereby mixing them. The cost of collecting littered wastes, or separating mixed wastes could be prohibitive, making recycling uneconomical. In order to productively utilize wastes, adequate and separate waste bins must be provided for collecting the different components of wastes. However, budgetary constraints may not allow many countries to purchase expansive waste bins for the different components of wastes. Consequently, a simple waste bin, comprising a metal frame on which polypropylene sack (pp-sack) can be hanged to collect inorganic wastes has been developed by the author. The waste bin (new bin) can be manufactured industrially using plastic or fabricated by local artisans at an affordable price. This document describes the new bin. Experience in collecting organic and inorganic wastes generated in a house in separate waste bins (waste segregation) for the past 16 years is also highlighted.

KEYWORDS: Domestic wastes, waste bin, recycling, pollution, waste segregation.

1 INTRODUCTION

A major environmental problem in many countries is pollution from domestic wastes, particularly polyethylene wastes. A sustainable solution to this problem is recycling, but recycling rate is very low in many countries. Out of the about 5 trillion polyethylene bags that are used per annum in the world; only 1% is recycled [1], [2], the rest end up in landfills and other parts of the environment. Two main factors could limit large scale recycling of wastes in Ghana and many developing countries. Firstly, these countries use the bulk method of waste collection, in which the same waste bin is used to collect all the components of wastes (plastic, organic, glass, metals etc) thereby mixing them. Secondly, a chunk of the wastes is littered on the environment, particularly along road sides, city streets and gutters. The cost of separating the mixed wastes or collecting and cleaning the littered wastes could make recycling unprofitable. These countries therefore, depend almost entirely on landfills to manage domestic waste, which has proved to be expensive and inefficient. In Ghana, waste management companies often have difficulties in acquiring new landfill sites to dump wastes. This shows that waste management that depends entirely on landfills is not sustainable. Other problems associated with dumping wastes in landfills are vegetation damage, unpleasant odours, ground water pollution, air pollution and global warming [3]. The root cause of littering in Ghana is that there is inadequate and often complete absence of waste bins in many homes and public places. It has become a normal practice in the country for people to drop wastes on the ground. Of greater concern is the fact that there are no waste bins in playing and feeding grounds of many schools in the country. If this situation persists, children from these schools will acquire the habit of littering, which could be difficult to change when they grow old.

A sustainable solution to the domestic waste problem is productive use of wastes such as recycling. This can succeed only if separate and adequate waste bins are provided for collecting the different components of wastes as done in advanced countries. This will reduce the cost of salvaging the different components of wastes, and make recycling profitable. Waste

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bins are inadequate in Ghana largely because they are very expensive. The common waste bins used in the country are made of plastic. Some landlords in the country collect wastes in polypropylene (pp)-sacks/bags and other containers when their plastic waste bins are full (figure 1 right).

Fig. 1. Feeding ground of a school in Ghana without waste bin, littered with polyethylene wastes, (left). Wastes in pp-bag and other containers at an entrance of a house in Ghana (right)

This shows that it is feasible to collect wastes in pp-sacks. However:

- The sacks are not covered therefore the wastes emanate strong stench and breed houseflies.
- Stray domestic animals often pull the sacks down and scatter the wastes in them, creating unsightly situation.
- It is not convenient for one person to open and fill a sack with wastes.
- A sack on the ground cannot serve as waste bin at public places.

Different types of frame on which bags are hanged for collecting wastes are used in many countries. However the known frames are complex to fabricate. Furthermore such waste bins are not used in Ghana and most developing countries. This document is on a new bin (developed by the author) comprising a metal frame on which a sack is hanged for collecting inorganic wastes. The frame is very simple compared to the existing frames and can be fabricated locally at an affordable price. The document also highlights experience on waste segregation at the household level and how it can be promoted.

2 DESCRIPTION OF THE NEW BIN

The new waste bin comprises a metal frame on which pp-sack is hanged for waste collection. The frame has an upper portion and a lower portion both of which are square (can be circular) in shape and are joined together by two bars as shown in figure 2 (left).

Fig. 2. Metal frame for hanging pp-sack (left), frame holding pp-sack covered with black polyethylene (middle); a full assembly of the new bin (right)

There is a pin at each of the four comers of the upper portion on which the sack is hanged. The lower portion of the bin frame serves as platform for the sack. The bin is assembled by hanging pp-sack on the pins and the sack is covered by black polyethylene as shown in figure 2 (middle). A full assembly of the bin has a cover (figure 2, right). The sack is reusable and can last up to 1 year before it may be discarded. Importantly, it can be replaced when it is full to prevent wastes overflow. The bin has a volume of about 400 litres or more depending on the size of the sack used.

2.1 COSTS

On commercial production, the new bin is expected to cost about GH¢ 20.00 (US$10.00) per bin compared with GH¢ 200.00 for the common plastic bins which rather are of a lower volume; 250 litres. According to Ghana Statistical Service, there are about 5 million households in the country. Currently most households have only one of the common plastic bins for waste collection (personal observation). In order to shift to waste segregation, each household would need 1-4 extra waste bins depending on the extent of segregation (separate bins for organic, plastics, paper, glass, metals and others).

Table 1 shows the budget needed to purchase the two types of bins depending on the quantity (assumed) that may be adequate to effectively collect wastes in Ghana. If 4 extra bins are to be provided for each household to segregate wastes, 20 million bins will be needed. This would cost GH¢ 4 billion and GH¢ 400 million if the common plastic and the new bins are used, respectively. In this case, the new bin would save the nation GH¢ 3.6 billion. If 5 million bins were needed, GH¢ 900 million will be saved by using the new bin instead of the common plastic bins. This does not include bins for waste collection in public places.

Table 1. Quantity (assumed) and costs of bins needed to effectively collect wastes in Ghana

Quantity of bins required (millions)	---------- Total costs of bins (million GH¢) ----------		Cost difference (million GH¢)
	Common bin @ GH¢ 200 per bin	New bin @ GH¢ 20 per bin	
20	4000	400	3600
10	2000	200	1800
5	1000	100	900

2.2 TESTING THE NEW BIN

The new bin has been used to collect inorganic wastes in my house at Kwamo, a suburb of Kumasi in Ghana from 1997 to date. The house is a fully detached apartment with six residents. Two of the residents are employed by the public sector and the rest are students of High School. Before the bin was introduced, all the household wastes were collected in the same bin as generally done in the country. With the introduction of waste segregation, two small bins were placed at the kitchen for inorganic and organic wastes (figure 3 left). The inorganic wastes were emptied into the new bin, and the wastes were dumped at the refuse site whenever the sack was full; because there is no recycling company around to absorb the wastes. Organic wastes on the other hand (mainly from the kitchen) were dumped in a temporary composting bin, installed at the home garden. The temporary bin is a plastic barrel with a volume of 250 litres; the top and bottom is open (figure 3 right). When the temporary composting bin was full, the wastes were heaped on the ground, composted, and the compost used for growing vegetables in the garden.

Fig. 3. Inorganic and organic wastes in separate bins at the kitchen (left), organic wastes harvested from the temporary composting bin (right) ready to be composted.

3 OBSERVATIONS

1. Initially pp-sack was hanged on the metal frame for waste collection but the sack biodegraded when exposed to sunlight for about 4 weeks. This problem was solved by covering the sack with black polyethylene. With this arrangement, the sack could be used for about 1 year before it got spoilt. It must be added that black polyethylene bag alone was not strong to accommodate more wastes.
2. Initially members of the house misplaced wastes in the different bins (e.g. organic wastes in inorganic bin) but this mistake ceased about 2 weeks after practicing waste segregation.
3. On the average, it took about 1 month for the sack to be filled with inorganic wastes.
4. On the other hand, it took about 5 months for the temporary composting bin to fill up. It took so long for the bin to fill up because the old wastes partially decomposed with time thereby creating more space.
5. Housefly (***Musca domestica L***) maggots grew in the organic wastes in the temporary composting bin. This was minimized by providing a cover for the bin.
6. Virtually no smell emanated from the organic wastes in the temporary composting bin, if the bin was closed.
7. Large quantities of edible mushroom sometimes grew on the compost heap during rainy seasons.

4 DISCUSSION

My experience on the bulk method of waste collection and waste segregation showed that waste segregation is far more advantageous. Waste segregation accumulates 'pure' organic wastes that can be composted for crop production. Even if the organic wastes were simply dumped at a refuse dump and unattended to, they would decompose naturally, and the resultant compost could be harvested and used to grow crops. In Ghana, this compost is called 'black soil', and it is in great demand for horticultural purposes. In general, domestic wastes in developing countries consist of over 50% organic material [4]. Studies done in Indonesia and Colombia found residential wastes composed of 78% and 90% compostable material, and market wastes 89% and 90% compostable respectively [5]. In India, about 45% by weight of municipal solid wastes in the cities is compostable [6]. Similarly, compostable material in municipal wastes from seven cities in Nigeria ranged from 30%-76% [7]. Thus collecting organic wastes in separate bins and composting for crop production could reduce the waste burden by 50% or more.

There is a scheme in India, which residents collect wastes in two categories-organic and inorganic [8]. The organic wastes are fed into composting pits and processed into compost for crop production, whilst trained rag pickers sort the inorganic wastes further for recycling. The benefits of this scheme include

- Accumulation of valuable recyclable materials
- Compost for crop production
- Reduced burden on landfill sites
- Reduced cost of waste management on government.

In Ghana waste collection companies often do not collect waste promptly from residential areas. This results in waste bins overflowing with wastes, which emanate strong stench and breed houseflies. If only organic wastes were collected in the common plastic bin, it would take a long time to fill up. This means that the bin can remain closed for a long time, and this will virtually eliminate stench and flies. The inorganic wastes that do not smell can be collected in sacks and kept for a long time without any nuisance. Thus waste segregation can reduce the inconveniences that people go through when domestic wastes are not collected promptly. It is therefore, important to adopt waste segregation even if there are no facilities to recycle the accumulated wastes. Indeed it will be difficult for a major recycling program to succeed in a country like Ghana where the chunk of wastes is littered on the environment and the rest is collected in bulk. The program will not have enough wastes to recycle. Waste segregation generates recyclable materials, which can encourage investors to establish recycling factories. However, the best strategy would be to promote waste segregation alongside recycling.

It could take considerable time and effort for many developing countries to successfully adopt waste segregation. This is because the citizens generally have the habits of littering or putting all the components of waste in the same bin; and habits are often difficult to change. With strict supervision, it took about 2 weeks for members of my household to be accustomed to waste segregation. However, if any country fails to promote waste segregation now, the habit of littering and collecting

wastes in bulk will be passed on to future generations and create more serious problems in future. It is therefore a disservice to future generations if any country fails to stop the habit of littering and collecting wastes in bulk.

It should be easier for a country to begin waste segregation at homes and schools where family and school heads could supervise. If the citizens do not know how to use separate bins in homes and schools, waste segregation is not likely to succeed in public places.

For the past 16 years all the organic wastes in my house have been used as compost for vegetable production. If this is done in most homes, it would drastically reduce the wastes that end up in landfills and rather increase food production. It is therefore prudent for every country to promote home composting for gardening. It must be noted that home composting for gardening is a well developed industry in many countries. And there are firms that specialize in production of inputs for this industry such as home composting bins and worms to aid decomposition of the wastes. Countries that want to promote this industry must design a policy to ensure that new buildings have space for composting and gardening. It is however not feasible to compost wastes in every home; for example, compound houses or flats. Wastes from such homes may be composted at communal waste dumps, which exist in many settlements. Currently, city authorities in Ghana and other countries charge fees for collecting household wastes. In order to encourage waste segregation, households that segregate should pay less than those that do not. Charging waste segregators less is sustainable because the resultant wastes could be recycled to generate extra revenue.

The perception is that home composting produce strong stench. Indeed members of my house held that view before the system was introduced, but this turned out to be false. Home composting produces no more stench than toilet septic tanks, which most homes have. Another perception is that waste segregation involves extra work and time compared with the bulk method of waste collection. It sounds as if people have to separate wastes that are mixed together. This is not the case; rather anyone with waste simply puts it in the allotted bin.

One major problem that frequently occurs in Ghana is waste bins overflowing with wastes due to delays in collecting wastes. If this happens, people are compelled to drop wastes on the ground, causing unsightly situations. If the new bin is used to collect wastes, sacks that are full can be replaced by street sweepers.

Dumping wastes at landfills, gutters and communal dumping sites profusely breed house flies that spread diseases. As indicated above, there are specially designed bins with covers that are used in many countries to compost organic wastes at the household level. Home composting using these bins drastically minimizes the incidence of houseflies. Notwithstanding their nuisance, housefly maggots could be used to produce a meal (Magmeal) which is rich in protein and suitable for livestock production [9]. In this regard, a company in South Africa, AgriProtein Technologies, has begun a magmeal program to produce sustainable protein feed for livestock like pigs and chickens [10]. Waste segregation requires substantial investment for acquisition of waste bins. At each point of waste collection, separate bins are needed to collect plastics, paper, glass, organic, and metallic wastes. Many developing countries have serious budgetary constraints, and may not be able to purchase multiple quantities of expensive bins. This problem could be addressed by using the new bin to collect inorganic wastes. The frame could be fabricated by local artisans or manufactured industrially using plastic.

5 CONCLUSION

The serious domestic waste management challenges confronting many developing countries could be ameliorated through productive use of the wastes. The first important step that must be taken in many countries to encourage productive use of wastes is the use of separate bins for collecting the various components of wastes. This method of waste collection requires substantial investment for the acquisition of waste bins. The initial investment could be minimized by using the new bin. Studies should be conducted to determine the potential of organic wastes from waste segregation as substrate for mushroom and magmeal production.

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Tendance dans les émissions de Gaz à Effet de Serre (GES) imputables au sous-secteur Agriculture au Togo

[Tendency in the Greenhouse Gas (GHG) emissions attributable to the Agriculture subsector in Togo]

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ABSTRACT: Greenhouse effect, which contributes to the climate warning, is a mechanism that occurs in the lower atmosphere because of the presence of Greenhouse Gas (GHGs). Its reinforcement by the emissions of anthropogenic greenhouse gases has harmful consequences on the climate. Togo, a developing country, contributes more to this reinforcement by the emissions related the socio-economic activities due to the Agriculture, Forestry and Other Land Use (AFOLU) area. We carried out these inventories of Greenhouse Gas in accordance with the IPCC Guidelines for National Greenhouse Gas Inventories, version 2006, using CCNUCC software for the national inventories of GHGs. In 2004, basic year selected, based on the quality of the data, the Agriculture subsector emitted 2407.88 Gg CO_2-e of direct GHGs (CH_4, N_2O) and 252,72 Gg of GHGs precursors (NO_x, CO). In Togo, these emissions have a tendency to increase passing the aggregated emissions from 2085.89 Gg CO_2-e in 1990 to 2526.22 Gg CO_2-e in 2008. The assessment of key categories of national emissions gave the priority to the biomass of cropland remaining cropland followed by biomass of forest land converted to cropland. These estimations will enable policy makers to take right decisions in matters of mitigation and adaptation and use them as baselines for calculations of carbon credits.

KEYWORDS: Activity data, emission factor, greenhouse gas, global warming potential, climate change.

RESUME: L'effet de serre, qui contribue aux réchauffements climatiques, est un mécanisme qui se manifeste dans la basse atmosphère à cause de la présence des gaz à effet de serre (GES). Son renforcement par les émissions de GES d'origine anthropique a des conséquences néfastes sur le climat. Pays en développement, le Togo contribue plus à ce renforcement par les émissions imputables aux activités socio-économiques liées au secteur de l'Agriculture, Foresterie et autres Affectations des Terres. Ces émissions ont été estimées conformément aux Lignes directrices du GIEC pour les inventaires nationaux de GES, version 2006, à l'aide du logiciel de la CCNUCC pour les inventaires nationaux de GES. Au titre de l'année 2004, choisie comme année de base sur la base de la qualité des données, le sous-secteur Agriculture a émis 2407,88 Gg CO_2-e de GES directs (CH_4, N_2O) et 252,72 Gg de précurseurs (NO_x, CO). Au Togo, ces émissions ont une tendance à l'augmentation faisant passer les émissions agrégées de 2085,89 Gg CO_2-e en 1990 à 2526,22 Gg CO_2-e en 2008.

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L'évaluation des niveaux d'émission nationale a montré que la biomasse des terres cultivées restant terres cultivées et la biomasse des forêts converties en terres cultivées sont les principales sources clés d'émissions. Ces estimations pourront permettre aux décideurs politiques de prendre les bonnes décisions en matière d'atténuation et d'adaptation et servir de lignes de base aux calculs des crédits carbone.

MOTS-CLEFS: Donnée d'activité, facteur d'émission, gaz à effet de serre, potentiel de réchauffement global, changements climatiques.

1 INTRODUCTION

L'effet de serre, qui contribue au réchauffement climatique, est un mécanisme qui se manifeste dans la basse atmosphère à cause de la présence de Gaz à Effet de Serre (GES) tels que : CH_4, N_2O, CO_2, NO_x, CO, COVNM et SO_2 [1], [2], [3]-[4]. Pays en développement, le Togo vit essentiellement des produits de la terre et par conséquent, contribue au renforcement de l'effet de serre par les pratiques agricoles telles que le brûlage dirigé des savanes, la combustion sur place des résidus agricoles, les rizières (inondées) et l'élevage du bétail constituent une importante source d'émissions de méthane (CH_4) et de l'oxyde nitreux (N_2O) qui sont des gaz à effet de serre directs (GES) ; du monoxyde de carbone (CO) et des oxydes d'azote (NO_x) qui sont des précurseurs d'ozone (O_3), gaz à effet de serre indirects.

Cet inventaire de GES non réglementés par le Protocole de Montréal dans le sous-secteur Agriculture au Togo est mené principalement sur les émissions de CH_4 dues à la riziculture, à la fermentation entérique et aux systèmes de gestion des fumiers ; sur les émissions de N_2O dues aux systèmes de gestion des fumiers ; et sur les émissions de NO_x et de CO du brûlage dirigé des savanes et de la combustion sur place des résidus agricoles. Les estimations couvrent la série temporelle 1990-2008 avec l'année 2004 choisie comme année de base du fait qu'elle représente aux mieux la situation socio-économique du pays. L'inventaire a suivi les méthodologies du GIEC depuis la collecte des données jusqu'aux inventaires des émissions et des absorptions de GES [5].

Cette étude a permis de présenter la situation des émissions de l'année 2004 et notamment la détermination des sources clés ainsi que les tendances dans les émissions pour permettre aux décideurs politiques de prendre les bonnes décisions en matière d'atténuation et d'adaptation.

2 METHODOLOGIE ET MATERIEL D'ETUDE

2.1 METHODOLOGIE

L'identification et la quantification des gaz à effet de serre (GES) que nous présentons pour le sous-secteur Agriculture au Togo ont été guidées par deux méthodologies. Il s'agit de la décision 17/CP.8 de la Convention-cadre des Nations Unies sur les Changements Climatiques (CCNUCC) d'une part [6], qui d'ailleurs conseille l'utilisation des lignes directrices du GIEC pour les inventaires nationaux de GES. Dans le cadre de notre travail, nous avons utilisé à la fois les lignes directrices du GIEC, version révisée 1996, les recommandations contenues dans les guides de bonnes pratiques GIEC GPG 2000 et GIEC-LULUCF 2003, les lignes directrices 2006, le manuel d'utilisateur du GIEC et le document du PNUD [7], [8], [9], [10], [11]-[5].

Pour réaliser cet inventaire, nous avons exécuté plusieurs tâches parmi lesquelles la détermination des données de base, le choix des méthodes d'estimation sur la base des données disponibles, le calcul des émissions, l'élaboration des procédures d'assurance de la qualité et de contrôle de la qualité et l'analyse des incertitudes [5]. Pour ce faire, nous avons procédé à la collecte de données d'activités dans les services et institutions agrées tels que le Ministère de l'Agriculture et de la pêche, la Direction générale de l'Agriculture, la Direction des statistiques Agricoles de l'information et de la Documentation (D.S.I.D.), le Centre d'Information des Nations Unies (C.I.N.U) de Lomé, la Direction générale des statistiques et la Représentation de l'Organisation des Nations unies pour l'Alimentation et l'Agriculture (FAO). Les défauts constatés dans les données de base ont été comblés par des techniques de raccordement, d'interpolation et d'extrapolation et parfois à partir de jugement d'experts en tenant compte des circonstances nationales. Nous n'avons utilisé pour les estimations que des facteurs d'émissions par défaut proposés par le GIEC du fait qu'au niveau national il n'existe pas de facteurs estimés localement et validés par le GIEC [12]. Les incertitudes liées aux estimations sont les résultats des méthodes de propagation d'erreurs sur les données de base.

Les opérations ayant conduit aux estimations ont été effectuées conformément aux équations du GIEC contenues dans les Lignes directrices 2006 du GIEC dont la forme la plus simple est :

$$\textbf{Emission} = \textbf{DA} \,.\, \textbf{FE} \qquad \text{(E1)}$$

Où DA désigne les Données sur les Activités et FE désigne les Facteurs d'Émission.

Dans les pools particuliers, nous avons utilisé des équations relatives :

- **au carbone des sols :** Les pertes annuelles de carbone de sols organiques drainés sont fournies par :

$$P_{Organiques} = \sum_{c} (S \,.\, FE)_c \qquad \text{(E2)}$$

- **au brûlage de biomasse :** Les quantités d'émissions de gaz à effet de serre (CH_4, N_2O) dues au feu sont issues de la relation :

$$P_{feu} = S \,.\, M_B \,.\, C_f \,.\, G_{ef} \,.\, 10^{-3} \qquad \text{(E3)}$$

- **à la riziculture :** Les émissions annuelles de méthane dues à la riziculture (Gg CH_4 .an^{-1}) sont exprimées par la relation suivante :

$$CH_{4\,Riz} = \sum_{i,j,k} (FE_{i,j,k} \,.\, t_{i,j,k} \,.\, S_{i,j,k} \,.\, 10^{-6} \qquad \text{(E4)}$$

- **équation relative au bétail :** Nous avons exprimé les émissions annuelles de méthane dues à la fermentation entérique et à la gestion du fumier par :

$$CH_{4\,émis} = \sum_{(T)} \frac{(FE_{(T)} \,.\, N_{(T)})}{10^6} \qquad \text{(E5)}$$

Les paramètres des équations ci-dessus désignent :

S = variable d'activité (superficie, volume, poids,…)

FE = Facteur d'émission

M_B = Masse de combustible disponible à la combustion (tonnes/ha)

C_f = Facteur de combustion

G_{fe} = Facteur d'émissions de matière sèche brûlée (g/kg)

$N_{(T)}$ = Nombre de têtes de l'espèce de bétail/catégorie

T, t = période

2.2 MATERIEL D'ETUDE

Nos estimations ont été calculées à l'aide du Logiciel pour les inventaires de gaz à effet de serre destiné aux Parties non visées à l'annexe I de la CCNUCC, Version 1.3.2 [13]. Nous nous sommes servis du logiciel Orgin 6.0 et du programme Excel pour tracer des graphes.

3 RESULTATS ET DISCUSSION

3.1 RESULTAT DE LA COLLECTE DE DONNEES D'ACTIVITE

Au Togo, l'agriculture inclut dans les terres cultivées les champs, les parcs agroforestiers et les jachères, ce qui correspond à l'ensemble des travaux de la terre qui transforment le milieu naturel pour la production de végétaux et d'animaux utiles à l'homme. Le système de production agricole togolais associe plusieurs cultures. De ce fait, les données de superficies des statistiques représentent souvent les superficies « développées » des spéculations agricoles et non les superficies physiques

cultivées qui sont nettement inférieures (55% des superficies développées). Au fil des ans, l'agriculture togolaise a vu l'amendement du sol par les engrais organiques faire place à l'utilisation des engrais chimiques pour améliorer les rendements des sols. De même, les terres forestières et humides cèdent chaque année de l'espace aux cultures de rente (café, cacao, coton (Fig. 1.), palmier…), aux cultures vivrières (maïs (Fig. 2.), mil, sorgho,…) et à la riziculture. La collecte de bois de chauffage fait souvent suite aux récoltes (Fig. 3., Fig. 4.) et les deux activités perturbent énormément la biomasse des terres cultivées. Pour favoriser la repousse précoce de la végétation, les éleveurs togolais occasionnent le brûlage de la savane en saison sèche. L'agriculture togolaise occasionne le brûlage de savane et le brûlage sur place de résidus agricoles libérant ainsi dans l'atmosphère des GES et leurs précurseurs (Fig. 5.).

Le cheptel togolais est composé essentiellement de ruminants (bovins, ovins, caprins), de porcins, chevaux, et de volaille. La production des ruminants représente des sources d'émissions de GES d'une part, par la fermentation entérique des systèmes digestifs des ruminants et, d'autre part, par la décomposition des fumiers. Le bétail togolais passe la grande partie de son existence sur des pâturages où il se nourrit d'herbes (Fig. 6.). Le stockage solide et l'épandage des déchets issus de l'élevage au Togo constitueraient une source non négligeable d'émission d'oxyde nitreux (N_2O) à cause de la croissance du cheptel togolais.

Fig. 1. Champ de coton
Source : ICAT, 2011

Fig. 2. Champ de culture de maïs
Source : ICAT, 2010

Fig. 3. Champ de manioc

Fig. 4. Tiges de manioc pour le feu

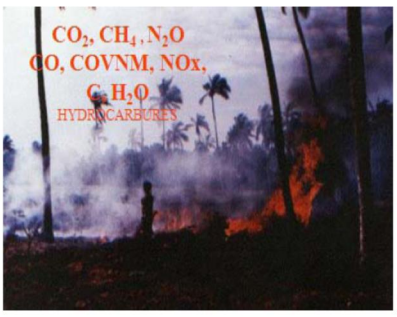

Fig. 5. Préparation des champs pour la culture
Source : AJAVON, 2004

Fig. 6. Bétail en pâturage
Source : AJAVON, 2004

Les données de base collectées sont dérivées en données d'activité et consignées dans le tableau 1 en tenant compte des conditions suivantes :

- la culture de riz au Togo est faite dans les trois régimes hydriques définis par le GIEC. Ainsi, nous avons désagrégé les données de la DSID en utilisant les proportions des superficies définies par ADRAO soit 75% pour le riz pluvial, 7% pour le riz irrigué et 18% pour le riz de bas-fond ou de nappe [14],
- les quantités d'engrais azoté appliquées au sol sont fournies en tonne métrique unité fertilisante (tonne métrique UF). Elles sont ramenées en tonne avec la teneur en azote (N) qui est de 46% pour l'urée ($CO(NH_2)_2$) et de 15 % pour l'engrais NPK,
- les terres de pâturage sont estimées à 106 ha par an et les statistiques de la FAO indiquent que 75% subissent le brûlage dirigé.

Tableau 1. Données d'activité du sous-secteur Agriculture au Togo

Année	Cultures		Engrais	Cheptel			
	Toutes cultures	permanentes	Urée +NPK	Bovins	Ovins (moutons)	Caprins (chèvres)	Porcins
	(10^3 ha)		(t.N)	(10^3 têtes)			
1990	1081	90	2275	243	1252	2043	354
1991	1061	95	1572	238	1060	1590	425
1992	980	95	3098	235	795	1193	434
1993	1377	100	2731	230	720	1080	429
1994	1286	100	3181	227	662	994	421
1995	1236	100	3376	203	501	814	331
1996	1476	100	5088	218	841	1091	288
1997	1399	120	2488	271	1150	1229	312
1998	1408	120	2910	273	1274	1292	345
1999	1221	120	4162	280	1415	1357	375
2000	1292	120	3783	288	1570	1425	394
2001	1309	120	4062	297	1600	1450	413
2002	1274	120	4794	306	1700	1460	434
2003	1299	120	7096	315	1800	1470	456
2004	1336	130	4884	325	1850	1480	478
2005	1419	140	7895	334	1850	1480	502
2006	1371	170	4881	344	1900	1490	527
2007	1362	170	6302	355	1950	1499	554
2008	1401	170	5278	366	2002	1508	582

3.2 ESTIMATION DES EMISSIONS DE GES : ANNEE DE REFERENCE 2004

Le choix de l'année 2004 comme année de base repose sur le fait qu'elle représente au mieux les situations socio-économiques du pays. Les estimations fournies dans le sous-secteur Agriculture au Togo portent sur les émissions des gaz sans CO_2 non réglementés par le Protocole de Montréal et des précurseurs de gaz à effet de serre. Il s'agit de deux gaz à effet de serre directs (le méthane (CH_4) et l'hémioxyde d'azote (N_2O)) et deux précurseurs (les oxydes d'azote (NO_x) et le monoxyde de carbone (CO)).

Les résultats atteints pour l'année de base sont résumés dans le Tableau 2 connu sous le nom de Tableau 17/CP.8. Conformément à la décision 17 de la huitième Conférence des Parties (17/CP.8), il est complété avec les mentions types de la CCNUCC à savoir : Néant pour notifier l'absence d'émission et NE (non estimées) pour les émissions existantes que nous n'avons pas estimées.

Tableau 2. Tableau récapitulatif 17/CP.8 pour l'année de base 2004

Country	TOGO			
Inventory Year	2004			
Catégories de sources et de puits de GES	**CH_4 (Gg)**	**N_2O (Gg)**	**NO_x (Gg)**	**CO (Gg)**
4. Agriculture	**54,58**	**4,07**	**5,54**	**247,18**
A. Fermentation entérique	27,62			
B. Gestion du fumier	1,75	0,02		
C. Riziculture	0,77			
D. Sols agricoles		3,89		
E. Brûlage dirigé de la savane	8,11	0,10	3,63	212,89
F. Brûlage sur place des résidus agricoles	16,33	0,05	1,91	34,29

Les émissions nettes (émissions moins absorptions) du sous-secteur Agriculture au Togo sont estimées à environ 311,37 Gg. Les gaz à effet de serre directs représentent 18,84% environ des émissions totales exprimées en Gg avec le méthane (CH_4) estimé à 54,58 Gg et l'hémioxyde d'azote (N_2O) à 4,07 Gg. Les gaz à effet de serre indirects sont estimés au total à 252,72 Gg dont le monoxyde de carbone (CO) avec 247,18 Gg et les oxydes d'azote (NO_x) avec 5,54 Gg.

Les émissions agrégées s'élèvent à 2407,88 Gg CO_2-e et sont réparties entre deux GES directs à savoir l'hémioxyde d'azote (N_2O) et le méthane (CH_4) dans les proportions respectives de 52,40% et 47,60%.

En 2004, le sous-secteur Agriculture a constitué une source d'émissions positives de méthane, d'hémioxyde d'azote, d'oxydes d'azote et de monoxyde de carbone au Togo. Les émissions de ces gaz sont imputables à six (6) pools de GES (Fig. 7.) dont la fermentation entérique, la gestion du fumier, la riziculture, les sols cultivés, le brûlage dirigé des savanes et le brûlage de résidus agricoles.

Des six pools de GES déterminés dans l'agriculture, c'est seulement dans les sols cultivés que l'émission du méthane est sans objet. Les émissions de CH_4 se répartissent dans l'ordre entre la fermentation entérique (27,62 Gg), le brûlage des résidus agricoles (16,33 Gg), le brûlage dirigé des savanes (8,11 Gg), la gestion du fumier (1,75 Gg) et la riziculture (0,77 Gg).

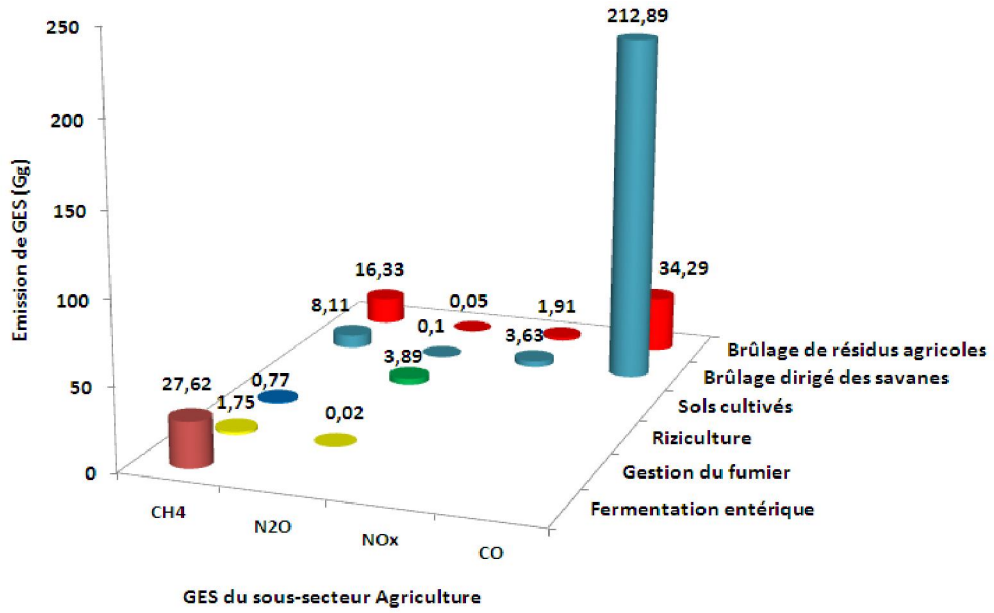

Fig. 7. Emissions de GES du sous-secteur Agriculture en 2004

Le méthane produit en fermentation entérique représente plus de la moitié (50,6%) des émissions agrégées du sous-secteur au cours de l'année 2004 estimées à 54,58 Gg. Il est de 29,92% pour les résidus agricoles et relativement faible pour la gestion du fumier et la riziculture.

Les sols cultivés sont la source principale d'émission de l'hémioxyde d'azote qui n'a pas lieu en fermentation entérique et en riziculture. Les émissions de N_2O sont imputables aux sols cultivés (3,89 Gg), au brûlage dirigé des savanes (0,1 Gg), au brûlage de résidus agricoles (0,05 Gg) et à la gestion du fumier (0,02 Gg). Le total des émissions d'hémioxyde d'azote en 2004, dans le sous-secteur Agriculture, est estimé à 4,06 Gg dont 95,81% sont attribuées aux sols cultivés.

Les deux précurseurs émis dans l'agriculture ont pour sources le brûlage dirigé des savanes et le brûlage des résidus agricoles. En 2004, les émissions des oxydes d'azote sont estimées à 5,539 Gg soit dans les proportions de 65,52% et 34,48% respectivement pour les deux sources. Quant au monoxyde de carbone, c'est le brûlage dirigé des savanes qui a émis près de 86,13% du total de 2004 qui s'élève en agriculture à 247,18 Gg.

L'analyse des résultats obtenus dans le sous-secteur Agriculture permet de retenir que les émissions agrégées, de tous les gaz du secteur Agriculture, calculées séparément pour les GES directs (Gg CO_2-e) et pour les précurseurs (Gg), se répartissent en deux groupes dont les compositions sont les suivantes:

- ✓ **2407,88 Gg CO_2-e de GES directs dont les proportions par pool sont:**
  - 1226,9 Gg CO_2-e émis en provenance des sols cultivés (50,95%) ;
  - 580,02 Gg CO_2-e émis en provenance de la fermentation entérique (24,09%) ;
  - 358,43 Gg CO_2-e émis en provenance du brûlage des résidus agricoles (14,89%) ;
  - 201,31 Gg CO_2-e émis en provenance du brûlage dirigé des savanes (8,36%) ;
  - 42,95 Gg CO_2-e émis en provenance de la gestion du fumier (1,78%) ;
  - 16,17 Gg CO_2-e émis en provenance de la riziculture (0,67%).

- ✓ **252,72 Gg de précurseurs dont les proportions par pool sont :**
  - 36,2 Gg émis en provenance du brûlage des résidus agricoles ;
  - 16,52 Gg émis en provenance du brûlage dirigé des savanes.

Selon le GIEC, les catégories de source clés sont celles qui cumulent plus de 95% de la somme des évaluations du niveau une fois ajoutées par ordre décroissant d'importance de leur émission. Sur la base de nos résultats et en conformité avec cette définition, les sources clés du sous-secteur Agriculture au Togo sont les sols agricoles, la fermentation entérique et le brûlage des résidus agricoles.

Ces trois catégories clés déterminées traduisent réellement les pratiques agricoles au Togo où le sol est annuellement labouré dans les profondeurs par plus de la moitié de la population avec des pratiques d'abatis-brûlis. Outre les peuhls, le petit élevage est pratiqué presque par tous les paysans togolais. Les pools de GES non sources clés dans le secteur de l'agriculture au terme de nos résultats sont donc le brûlage sur place des résidus de récolte, le brûlage dirigé des savanes et la riziculture.

3.3 INCERTITUDE SUR LES ESTIMATIONS DE GES DIRECTS

La méthode de propagation d'erreur est utilisée dans le cadre de notre inventaire. Nous avons estimé les incertitudes sur les estimations par pool (I_p) à l'aide de la moyenne géométrique des incertitudes (E6) sur les données d'activité (I_{DA}) et les facteurs d'émission (I_{FE}) et les incertitudes sur les émissions agrégées (I_A) sont calculées par la moyenne géométrique (E7) des incertitudes (I_p) des pools pondérées avec les estimations d'émission (E_p) des pools :

$$\boldsymbol{I_p = \sqrt{I_{DA}^2 + I_{FE}^2}} \quad \text{(E6)}$$

$$\boldsymbol{I_A = \frac{\sqrt{\sum_p (I_p \,.\, E_p)^2}}{|\sum_p E_p|}} \quad \text{(E7)}$$

Les incertitudes sur les émissions sont présentées dans le tableau 3.

Tableau 3. Incertitudes sur les estimations de GES directs

Année de base 2004	CH_4				N_2O			
	Emission Gg CO_2-e	I_{DA}	I_{FE}	Incertitude combinée	Emission Gg CO_2-e	I_{DA}	I_{FE}	Incertitude combinée
Agriculture	**1146,18**			**13,10%**	**1258,6**			**20,33%**
Fermentation entérique	580,02	15%	15%	21,21%				
Gestion du fumier	36,75	15%	15%	21,21%	6,2	15%	15 %	21,21%
Riziculture	16,17	25%	15%	29,15%				
Sols agricoles					1205,9	15%	15 %	21,21%
Brûlage dirigé des savanes	170,31	20%	10%	22,36%	31	20%	10 %	22,36%
Brûlage de résidus agricoles	342,93	20%	10%	22,36%	15,5	20%	10 %	22,36%

NB : *Em. = émissions ; Inc. Com. = incertitude combinée*
IDA = incertitude sur les données d'activité ; IFE = incertitudes sur les facteurs d'émissions

Les incertitudes sur les émissions agrégées de CH_4 et N_2O sont respectivement de 13,10% et 20,33%. Bien que les incertitudes des émissions agrégées soient moyennes, il faut noter cependant la riziculture est le pool d'incertitude la plus élevée à cause des difficultés à la génération de ses données d'activité. Ces données sur les incertitudes sont d'une grande utilité car elles permettront d'établir des priorités pour les prochains inventaires.

3.4 Tendance dans les Emissions De GES de 1990 a 2008

✓ **Evolution des émissions agrégées de GES directs**

Les émissions de GES directs du sous-secteur Agriculture ont évolué en deux (2) phases sur la série temporelle 1990-2008. La première est une diminution qui fait passer les émissions de 2085,89 Gg CO_2-e en 1990 à 1341,66 Gg CO_2-e en 1995 soit un taux de décroissance moyen de 148,85 Gg CO_2-e par an. La seconde est une augmentation non linéaire entre 1995 et 2008.

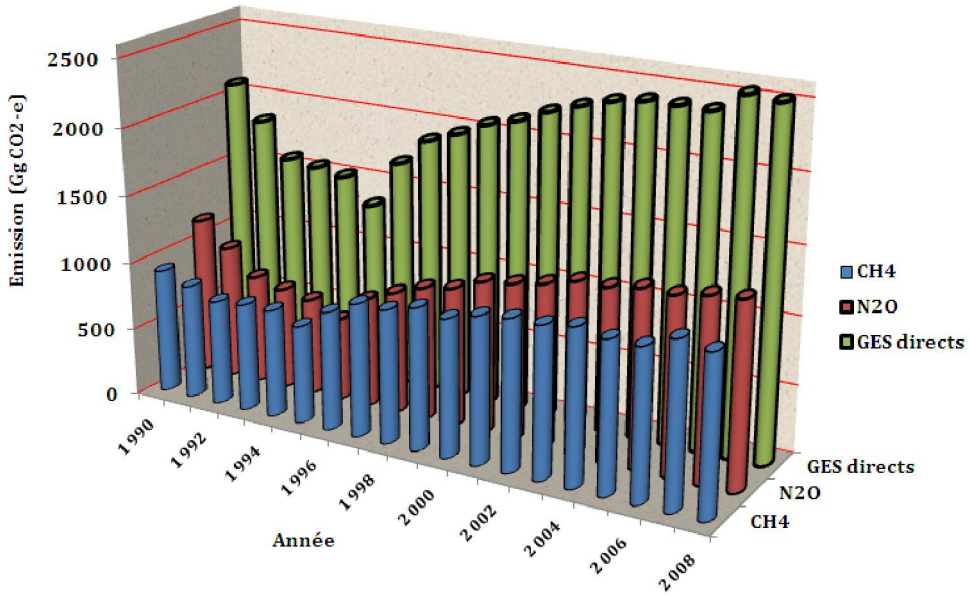

Fig. 8. Évolutions des émissions agrégées de GES directs

✓ **Tendance dans les émissions**

Les tendances dans les émissions expriment les taux de variations des émissions par rapport à l'année 1990 que nous avons prise comme origine des dates.

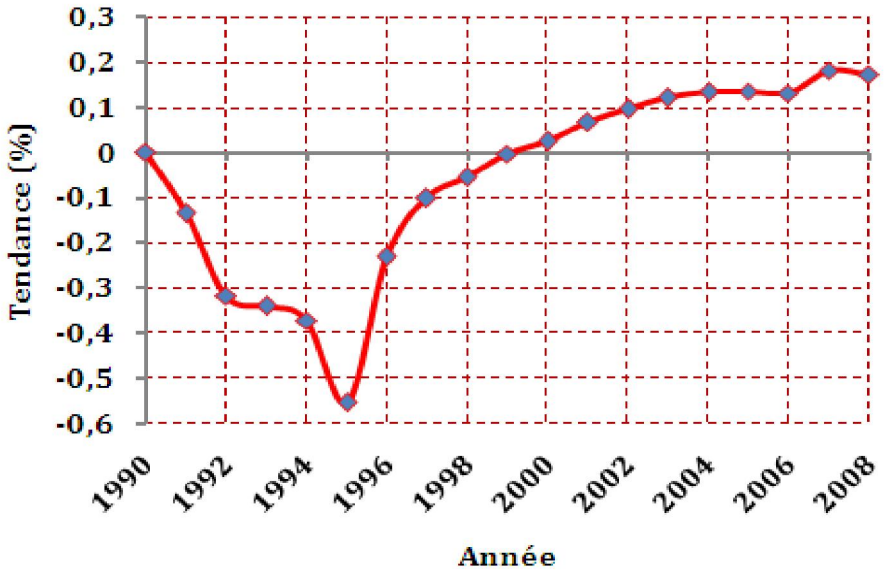

Fig. 9. Courbe de tendance dans les émissions

Les valeurs de tendances annuelles au cours de la période 1990-2008 pour les émissions agrégées de GES directs dans le secteur-secteur sont obtenues avec la relation (E8).

$$\boldsymbol{Tendance}\ (\%) = \frac{E_{x,t} - E_{x,0}}{E_{x,t}} .1\ 00 \qquad \text{(E8)}$$

Avec :

$E_{x,t}$ = estimation d'émissions de la catégorie de source x pour l'année t

$E_{x,0}$ = estimation d'émissions de la catégorie de source x pour l'année 0 soit 1990.

La courbe de tendance présente une croissance continue des émissions de GES imputables à l'agriculture depuis 1995. A partir déjà de 1999, les émissions sont au-dessus des origines, ce qui constitue une alerte.

4 CONCLUSION

Cet inventaire des GES dans le secteur AFAT au Togo nous a permis d'estimer des émissions sur la série temporelle 1990-2008 avec l'année 2004 choisie comme année de référence. Les résultats obtenus ont porté sur trois GES direct (CO_2, CH_4, N_2O) et deux GES indirect (NO_x, CO). Les émissions se répartissent entre les sous-secteurs Agriculture et AFAT.

En 2004, année de base, le sous-secteur Agriculture a émis 2407,88 Gg CO_2-e de GES direct et 252,72 Gg de précurseurs tandis que le sous-secteur FAT a cumulé 9126,61 Gg CO_2-e de GES direct pour 577,311 Gg de précurseurs.

L'évaluation des niveaux d'émissions nationales a donné la priorité à la biomasse des terres cultivées (CC). L'analyse des catégories clés classe en tête la biomasse des terres cultivées restant terres cultivées (31,6%), suivie de la biomasse des forêts converties en terres cultivées (19,4%), dans l'ordre d'importance pour atteindre les 95% des émissions agrégées (11533,42 Gg CO_2-e) de 2004. L'analyse de la tendance des émissions agrégées a montré une augmentation. Elles sont passées de 5976,96 en 1990 à 13585,99 Gg CO_2-e en 2008. Globalement, le secteur AFAT au Togo est une source d'émission.

Pour réduire les émissions de GES dans le sous-secteur Agriculture au Togo, il faudra procéder à la sensibilisation de la population pour des pratiques de feux de brousse avant la grande période d'harmattan, le compostage à l'aide des déchets agricoles pour la fertilisation des sols et l'association de l'élevage à la culture.

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Concurrent Infection of Gastro-Intestinal Parasites and Bacteria Associated with Diarrhea in Bengal Goats in Bangladesh

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ABSTRACT: Hundred diarrhoeic kids' faecal samples were examined of which 64% and 98% kids are affected with parasites and bacteria respectively. Around 59.7% and 61.22% had single, 31.34% and 37.76% had dual and only 4.48% and 1.02% had triple concurrent infection respectively in parasite and bacteria associated diarrhoeic kids. Analysis of the results of bacterio-parasitic enteropathogens revealed that highest percentage (64%) kids were infected with concurrent parasitic and bacterial infection but the faecal samples of four diarrhoeic kids showed negative for both bacteria and parasitic infections. Highest of gastro-intestinal nematodes (GIN) infection (48%) was recorded in kids followed by *Eimeria* sp. (27%), *Toxocara vitulorum* (14%) and lowest (1%) with each of the *Strongyloides* sp., *Paramphistomum* sp. and *Moniezia* sp. The clinical *Toxocara vitulorum* infection first recorded at the first of 15 days, GIN at 30 days, *Strongyloides* sp. at 45 days, *Paramphistomum* sp. at 150 days and *Eimeria* sp. infection at 25 days. Similarly, the rate of *Bacillus* infection (87%), was found highest followed by *Escherichia coli* (37%), *Staphylococcus* (9%), and lowest of *Salmonella* (5%) infection. Although *Bacillus* and *E. coli* recorded first time at 10 days and *Staphylococcus* at 30 days of age but *Salmonella* was recorded at the age of 60. A characteristic age specific prevalence of both parasitic and bacterial enteropathogens was observed and it was found that the severity of infection was increasing with age for both parasitic and bacterial infection and the ratio of all the infections were almost similar.

KEYWORDS: Parasite, bacteria, diarrhea, Bacterial infection, Bengal goat.

1 INTRODUCTION

Diarrhoea, caused by different enteropathogens has been recognized as a major clinical problem for calves in Bangladesh [7]. Debnath *et al*., [6] reported 52% loss of kid production both through morbidity, and mortality caused by gastroenteritis in Bangladesh. Enteropathogens include bacteria, viruses, fungi, protozoa, and helminthes have been recognized to be associated with diarrhoea [14]. Reports on enteropathogens associated with kid diarrhoea are very limited in Bangladesh. Therefore, an attempt was made to determine the parasites, and bacteria associated with kid diarrhea in Bangladesh. At present in our sub-continent, importance on livestock health, and production is not significant. As a result, protein deficiency becomes an unsolved problem. Therefore, enhancement on small ruminants production especially goat in small scale agriculture assume the great significance [9]. So current study will designed with the following objectives:

1. To find out the definite gastro-intestinal parasites, and bacteria responsible for goat/kid diarrhoea so that appropriate regulatory actions are taken.
2. To enhance the dynamism of goat farming that will alleviate the poverty as well as boost up the national economy.

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2 MATERIALS & METHODS

This study was carried out randomly selected 100 clinically diarrhoeic kids aged between 10 to 180 days of Bengal goats in Bangladesh Livestock Research Institute Goat Farm during two years periods from May 2004 to April 2006 at Goat & Sheep Production Research Division (GSPRD), Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka-1341, Bangladesh.

2.1 SAMPLE COLLECTION

Faecal samples were selected as experimental samples. 20 gram (gm) faecal samples of each of the selected diarrhoeic kids were collected directly from the rectum aseptically in sterile vials and transferred to the laboratory for Bacterio-parasitological examinations and occasionally stored at – 20^0C until tested. Special care was always taken to avoid contamination as possible.

2.2 MEDIA PREPARATION

Different commercially available media were prepared according to the direction of the manufacturer's for culture, and sub-culture of the organisms in order to get pure culture by proper isolation, and identification.

2.3 PARASITOLOGICAL EXAMINATION

Most of the tapeworm, and ascarid infection in kids was recognized with naked eye at the time of collection of faecal samples by the presence of segments, and adult ascarid worms respectively. The tapeworm segments were grinded with mortar and pestle with small amount of water and then the fluid was examined under microscope to confirm the *Moniezia* sp. Each of the collected faecal samples was examined on conventional direct smear method and followed by sedimentation methods to detect parasitic eggs which were identified by their morphological features as described by Samad [15]. As it was difficult to differentiate the eggs of different species of nematode parasites and accordingly they were grouped as Gastro-intestinal Nematode (GIN) parasites. Faecal samples that were found positive for parasitic infection on direct conventional method were also examined by quantitative Stoll's dilution technique for counting egg per gram (epg) of faeces for helminthes' eggs and Mac-Master method for counting *Eimeria* oocysts as described by Samad [15] & epg ≥ 200 and oocysts ≥ 5000/g of faeces were considered significant for clinical infections [17].

2.4 BACTERIOLOGICAL EXAMINATION

All the 100 randomly selected diarrhoeic faecal samples of kids were examined for isolation and identification of bacteria. Each of the faecal samples was streaked on Nutrient agar, and Blood agar to promote bacterial growth. The colonies on primarily cultures were repeatedly sub-cultured by Streak Plate Method [4] until pure culture with homogenous colonies were obtained. Media like Nutrient agar, Blood agar, *Staphylococcus* Medium No-110, Eosin Methylene Blue (EMB), MacConkey agar, Triple Sugar Iron (TSI) media, *Salmonella-Shigella* agar (SS) were used for sub-cultures. Bacteria were identified by Gram Staining [5], cultural, morphological characters, and biochemical (Sugar fermentation with five basic sugar e.g. Dextrose, Sucrose, Lactose, Maltose, and Mannitol), Catalase, Coagulase & IMViC utilization) tests as described by Buxton and Fraser [3].

2.5 STATISTICAL ANALYSIS

The results were analyzed statistically by using chi-square test for significances [8].

3 RESULTS & DISCUSSION

Bacterio-parasitological methods were used to determine the gastro-intestinal bacteria and parasites associated with diarrhoea in kids. The age of kids and pathogen factors (single and concurrent infection) were assessed for the occurrence of the disease. The faecal examination of 100 diarrhoeic kids revealed that 64% kids were affected with different types of GI parasites (Table.1) and 98% kids had different types of bacterial infections (Table.2). These observations support the earlier reports of Hossain *et al*., [10] who reported 58.2% mortality of kids due to GI helminthiasis and Samad [16] reported 82.62% clinically sick kids had GI parasitic infection. Of the 64% kids affected with GI parasites, of which 59.7% had single, 31.34% had dual, and only 4.48% three types of concurrent parasitic infection (Table.1). This finding supports the earlier report of Samad [16] who reported 63.32% single, 33.74% dual, and only 2.94% triple GI parasitic infection in calves. Similarly, of the

98 diarrhoeic kids affected with bacterial enteropathogens, of which 61.22 % had single type, 37.76% had two types, and only 1.02% had three types of infection (Table.2).

Table 1. Pattern of occurrence of single and mixed gastro-intestinal parasites in diarrhoeic kids

S/N	Parasites	Age in days			Total (N=100)	
		10-30 (N=16)	31-90 (N=37)	91-180 (N=47)	No	%
1	*Toxocara vitulorum* (TV)	-	-	-	-	**59.7***
2	GI Nematodes (GIN)	02	04	26	32	
3	*Strongyloides* (S)	-	01	-	01	
4	*Eimeria* sp. (E)	02	03	02	07	
Total (Single infection)		**04**	**08**	**28**	**40**	
5	GIN + E	04	04	02	10	**31.34**
6	TV + E	01	06	-	07	
7	GIN + *Moniezia* sp. (M)	-	-	01	01	
8	GIN + *Paramphistomum* sp.	-	-	02	02	
9	GIN + TV	-	01	-	01	
Total (Concurrent - 2 types)		**05**	**11**	**05**	**21**	
10	TV + GIN + E	-	02	-	02	**04.48**
11	GIN + *Trichuris* sp. + E	-	-	01	01	
Total (Concurrent - 3 types)		**-**	**02**	**01**	**03**	
Total(Concurrent infection)		**05**	**13**	**06**	**24**	**35.82**
Overall (single + mixed)		**09 (13.43%)**	**21 (31.34%)**	**34 (50.75%)**	**64**	**64.00**

N= No. of kids examined ***** *Significant at (p <0.01)*

Analysis of the result showed that kids aged between 10 to 30 days had low level of both parasitic (13.43%) and bacterial (16.33%) infections in comparison to 31 to 90 days (31.34% and 39.80% respectively), and 91 to 180 days (50.75% and 43.88% respectively) (Table.1 and Table.2). these findings are in conformity with the earlier report of Samad *et al.* [19] who reported low level of parasitic infection in calves up to 30 days of age in comparison to higher age group.

Table 2. Pattern of occurrence of bacterial enteropathogens in diarrhoeic kids

S/N	Bacteria	Age in days			Total (N=100)	
		10-30 (N=16)	31-90 (N=37)	91-180 (N=47)	No	%
1	*Escherichia coli* (EC)	01	04	03	08	**61.22**
2	*Bacillus* sp. (B)	09	18	24	51	
3	Staphylococcus sp. (Staph)	-	01	-	01	
Total (Single infection)		**10**	**23**	**27**	**60**	
4	B + EC	05	10	10	25	**37.76**
5	B + Staph.	-	03	01	04	
6	B + *Salmonella* sp.	-	01	04	05	
7	EC + Staph.	01	01	01	03	
Total (Concurrent - 2 types)		**06**	**15**	**16**	**37**	
8	EC + B + Staph.	-	01	-	01	**01.02**
Total (Concurrent – 3 types)		**-**	**01**	**-**	**01**	
Total (Concurrent infection)		**06**	**16**	**16**	**38**	**38.78**
Total positive		**16 (16.33)**	**39 (39.80)**	**43 (43.88)**	**98**	**98.00**
Total negative		**01(50.00)**	**-**	**01 (50.00)**	**02**	**02.00**
Over all (single + mixed)		**17 (17.34%)**	**39 (39.80%)**	**44 (44.90%)**	**100**	**100 (100)**

N = No. of kids examined

It indicates that the rates of infection of enteropathogens are increased with the increase of age of kids which is probably proportionate to the period of exposure to infection, and incubation period of the disease. The results of concurrent infection with GI parasites and bacteria showed that only 18.18% kids had single bacterial infection, 42.42% had two types, 30.30% three types, 08.08% four types and only 01.01% five types of infection of infections of either with bacteria or parasites or both (Table.3). It also appears that single bacterial enteropathogen could be associated with diarrhoea in kids (18.18%) but significantly higher rate of diarrhoeic kids (81.81%) were associated with concurrent infection, either with multiple bacteria or parasites or both (Table.3). From the results, it may be concluded that GI parasite may not be only responsible alone for kids' diarrhoea.

Table 3. Pattern of occurrence of parasitic and bacterial enteropathogens in diarrhoeic kids

S/N	Bacteria	Age in days			Total (N=100)*	
		10-30 (N=16)	31-90 (N=37)	91-180 (N=47)	No	%
1	*Bacillus* sp. (B)	02	06	07	15	
2	*Escherichia coli* (EC)	01	-	02	03	**18.18**
Total (Single infection)		**03**	**06**	**09**	**18**	
3	B + EC	04	05	01	10	
4	B + *Staphylococcus* sp. (Staph.)	-	01	-	01	
5	B + GI Nematodes (GIN)	02	04	13	19	
6	EC + Staph.	-	01	01	02	
7	EC + *Toxocara vitulorum* (TV)	-	01	-	01	**42.42**
8	EC + GIN	-	01	01	02	
9	GIN + *Paramphistomum* sp.	-	-	01	01	
10	B + *Eimeria* sp. (E)	02	02	02	06	
Total (Concurrent - 2 types)		**08**	**15**	**19**	**42**	
11	B + EC + Staph.	-	01	-	01	
12	B + S + GIN	-	-	03	03	
13	B + Staph + GIN	-	01	-	01	
14	B + EC + GIN	-	01	06	07	
15	B + EC + TV	-	02	01	03	
16	B + TV + E	01	01	-	02	
17	B + *Moniezia* sp. + GIN	-	-	01	01	**30.30**
18	B + E + GIN	03	03	01	07	
19	Staph. + EC + GIN	-	01	01	02	
20	Staph. + GIN + E	-	01	-	01	
21	EC + TV + E	-	01	-	01	
22	Staph. + EC + E	-	01	-	01	
Total (Concurrent – 3 types)		**04**	**13**	**13**	**30**	
23	B + EC + GIN + E	-	01	01	02	
24	B + Staph. + GIN + E	-	01	-	01	
25	B + EC + TV + E	01	02	-	03	**08.08**
26	B + S + TV + E	-	01	-	01	
27	B + E + GIN + TV	-	01	-	01	
Total (Concurrent – 4 types)		**01**	**06**	**01**	**08**	
28	B + EC + GIN + E + *Trichuris* sp.	-	-	01	01	**01.01**
Total (Concurrent – 5 types)		**-**	**-**	**01**	**01**	
Total (Concurrent infection)		**13**	**33**	**35**	**81**	**81.81**
Total positive (Single + mixed)		**16 (16.33)**	**39 (39.79)**	**43 (43.88)**	**99**	**99.00**

****** One kid (14 day-old) was negative for both parasite & bacteria, 18 kids had single bacteria, 14 had concurrent bacteria, one had concurrent parasites and 66 had concurrent bacteria and parasitic infections.*

3.1 GASTRO-INTESTINAL PARASITIC INFECTION

Microscopic examination of faecal samples showed higher rate of infection with GI nematodes (48.0%), followed by *Eimeria* sp. (27.0%), *Toxocara vitulorum* (14.0%) and lowest of 1% with each of the *Strongyloides* sp., *Paramphistomum* sp. and *Moniezia* sp. (Table.4).

The species of the GI nematode parasites associated with diarrhoea in kids have not been identified in this study and presence of any nematode eggs other than *Toxocara, Strongyloides* and *Trichuris* infection were considered to be GI nematodes. The 48% clinical occurrence of GI nematodes recorded in calves up to 180 days of age supports the earlier report of Samad [16] who reported 32.73% prevalence of parasitic gastro-enteritis caused by nematode parasites in calves. It appears that the clinical GI nematode infection started at the age of 30 days (10.42%) and then a steady increased with the age and highest rate was found at 91 to 180 days (64.58%) of age (Table.4).

In this study, clinical *Eimeria* sp. were recorded 27% in kids aged between 25 to 180 days but higher infection rate (59.26%) was observed in kids aged between 31 to 90 days (Table.4). These findings support the report of Radostits *et al.* [14] who reported 15 to 20 days prepatent and 6 to 30 days incubation period of *Eimeria* sp. infection.

Table 4. Age wise occurrence of parasitic and bacterial enteropathogens associated with diarrhoea in kids

S/N	Enteropathogens	Age in days			Total (N=100)	
		10-30 (N=16)	31-90 (N=37)	91-180 (N=47)	No	%
A. Parasites						
1	*Toxocara vitulorum*	01[a] (07.14)	12(85.71)	01 (07.14)	14	**14.00**
2	GI Nematodes	05[b] (10.42)	12 (25.00)	31 (64.58)	48	**48.00**
3	*Strongyloides* sp.	-	01[c] (100)	-	01	**01.00**
4	*Paramphistomum* sp.	-	-	01[d] (100)	01	**1.00**
5	*Moniezia* sp.	-	-	01[e] (100)	01	**1.00**
6	*Eimeria* sp.	06[f] (22.22)	16 (59.26)	05 (18.52)	27	**27.00**
B. Bacteria						
1	*Staphylococcus* sp.	01[x] (11.11)	06 (66.67)	02 (22.22)	09	**09.00**
2	*Bacillus* sp.	13[y] (14.94)	32 (36.78)	42 (48.28)	87	**87.00**
3	*Escherichia coli*	07[y] (18.92)	14 (37.84)	16 (43.24)	37	**37.00**
4	*Salmonella* sp.	-	01[z] (20.00)	04 (80.00)	05	**05.00**

N= No. of kids examined, GI= Gastro-intestinal, - = Negative, 1st recorded at the age of: [a]15 days, [b]30days, [c]45days, [d]150days, [e]91days, [f]25 days, [x]30 days, [y]10 days, [z]60 days.

Although *T. vitulorum* infection was recorded at the 15th days of age but higher infection rate was recorded in kids aged between 31 to 90 days (85.71%) of age in comparison to 10 to 30 (7.14%) and 90 to 180 (7.14%) days (Table.4). This finding supports the earlier report of Karim *et al.*, [11] who reported 44% subclinical *T. vitulorum* infection with infection rate in calves aged between 1 to 3 months (60%) than 4 to 6 months (28%) old calves. The findings of occurrence of clinical *T. vitulorum* infection in neonatal calves within the 1st two weeks of life suggest that *T. vitulorum* larvae have been passed to newborn calves through colostrum/milk [12]. This result also supports the description of Radostits *et al.* [14] who reported that *T. vitulorum* larvae are passed in great numbers in the colostrum 2 to 5 days after calving, worms age matured in the intestine of the calves by 10 days of age and eggs are passed by 3 weeks and then the adult worms are expelled from the intestine by 5 month of age, and for this reason, Toxocariasis has been considered as calf hood disease.

Only one case of *Strongyloides* infection in calf was recorded at the age of 45 days (Table.4). This finding supports the earlier observations of Moyo *et al.* [13] and Bharkad *et al.*,[2] who reported *Strongyloides* infection in calves of 2 to 4 months and up to 3 months of age, respectively.

Paramphistomum infection was recorded in only one calf at the age of 150 days (Table.4). The presence of adult *Paramphistomum* in the rumen has said not to be elicited any clinical response but in massive infestations are associated with the clinical signs [14]. However, kid affected with adult *Paramphistomum* (epg 700) which resulted fetid diarrhoea and ill-health.

Moniezia infection was recorded in one calf at the age of 91 days (Table-4). This finding supports the Radostits *et el.* [14] who described the signs of Moniezia infestation are restricted chiefly to animals less than six month of age. The clinical manifestation of *Moniezia* infestation have been described to be associated with diarrhoea and ill- health which are in conformity with the earlier report of Samad *et al.* [18] who reported and outbreak of Monieziasis with diarrhoea and ill-health in calves.

3.2 BACTERIAL ENTEROPATHOGENS

Bacteriological examination of faecal samples showed that 98% kids had either single or concurrent infection with four different types of bacteria (Table.2). Higher infection rate was recorded with *Bacillus* sp. (87%), followed by *E. coli* (37%), *Staphylococcus* sp. (9.0%) and lowest with *Salmonella* sp. (5%) (Table.4). The *Bacillus* sp. and *E. coli* organisms were recorded in the faeces from the 10 days age of kids, and *Staphylococcus* sp. from 30 days of age but *Salmonella* sp. from 60 days of age in diarrhoeic kids (Table.4). These rates of infection support the earlier reports of Debnath *et al.* [7] who reported 20% *E. coli* and 3% *Salmonella* sp. infection in diarrhoeic calves. The results also supports the findings of *Haque et al.,* [9] who reported *Salmonella* sp. (5.0%), *Staphylococcus* sp. (10.0%), *Escherichia coli* (25.0%) and *Bacillus* sp. (85.0%) in diarrhoeic goats. Amin *et al.*, [1] also reported the prevalence of enteropathogenic *E. coli* in 10%, 8.57% and 9.38% diarrhoeic calves less than one year of age in three different dairy farms in Bangladesh.

4 CONCLUSION

Bengal goats are potential and economic livestock of Bangladesh. A large number of goats are decreasing in regular basis due to diarrhoea. This study was carried out to identify the main etiological agents of diarrhoea and it was found that *Toxocara vitulorum*, GIN, *Strongyloides* S., *Eimeria* sp., *Moniezia* sp., *Paramphistomum* sp., *Trichuris* sp., *Escherichia coli*, *Bacillus* sp., *Staphylococcus* sp., *Salmonella* sp. altogether play a vital role for goat/kid diarrhoea. Results of this study will help to develop an effective treatment method of goat/kid diarrhoea against those organisms.

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Epidemiological Studies on Kid Diseases Associated with Morbidity and Mortality in Intensive and Semi-Intensive Systems in Bangladesh

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ABSTRACT: Kid diseases were investigated on 240 sick kids of small holder farm during two years period from June 2002 to May 2004 of which 76 (31.67%) kids died during research period. Higher mortality rate was recorded in male (16.28%) than female (13.00%) under farm condition, though the difference was not statistically significant. Both the morbidity (42.17%) and mortality (18.29%) rates in kids aged between 0 to 30 days old were found to be significantly (P<0.01) higher in comparison to age between 31 to 90 days (morbidity 31.81% and mortality 13.64%) and aged between 91 to 180 days (morbidity 26.02% and mortality 10.19%). It may be concluded from this result that in avenging condition a farmer should give special attention to the kid from birth to 3 month of age. Although the morbidity range was found to be significantly (p<0.01) higher during rainy (72.37%) in comparison to winter (52.40%) and summer (41.50%) seasons but the mortality rate was found higher during summer (18.03%), followed by winter (13.70%) and lowest during rainy (10.12%) season. It was also observed that 58.25% kids maintained under rural conditions are deprived from first colostrum due to ignorance, which necessitates the veterinary extension services to the rural small holder traditional goat farmer. 14 types of kid diseases were diagnosed at Bangladesh Livestock Research Institute Goat Farm and ten types at the small holder farms and their epidemiological different pattern of occurrence were analyzed and discussed.

KEYWORDS: Epidemiological, Kid diseases, Morbidity, Mortality, Intensive, Semi-intensive, Farm condition.

1 INTRODUCTION

The success of any breeding program depends upon the rate of survival of kid crop produced and accordingly kid morbidity, and mortality are of great concern to farmers because kid mortality represents an irrefutable, and irrevocable financial, and genetic loss of the goat industry. Kid morbidity and mortality has been the subject of much research in the last three decades world wide but very limited works have been made from Bangladesh. The economic costs of kid mortality to the individual farmer have been estimated elsewhere [1, 14] but no such attempt has been made in Bangladesh. Most of the inlands reports based on hospital and or farm record and pathological findings [6,7,8] but there seems to be no reports on etio-epidemiological factors associated with kid morbidity and mortality in Bangladesh. All the findings were in calves and obviously this is the first time work in goat in Bangladesh. Infectious diseases have been recognized as one of the most important limiting factors in the kid production worldwide but this situation is further deteriorated because of continuous and indiscriminate uses of antibacterial drugs which has been found to result in the emergence of drug resistance by pathogenic bacteria (11, 22) but no such reports has been made under local conditions. Considering those factors this work has designed to the following objectives.

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1. To determine the etio-pathological factors and assessment of economic losses associated with kid morbidity, and mortality in intensive and semi intensive conditions in Bangladesh.
2. To find out the definite gastro-intestinal parasites, and bacteria responsible for goat/kid morbidity and mortality so that appropriate regulatory actions are taken.

2 MATERIALS & METHODS

The etio-epidemiological investigation on morbidity and mortality of kids up to 6 months of age was under taken for two years periods at Bangladesh Livestock Research Institute Goat Farm (BLRIGF), Savar, Dhaka during May 2003 to April 2005 based on the records of 415 Black Bengal kids. Kid morbidity was defined as any sickness that had recognizable clinical manifestations.

The epidemiological data and samples of faeces, blood smears, bacteriological swabs, and tissue samples of dead kids, and milk samples from doe (to determine the source of infection to kids) were collected and the diseases were diagnosed on clinical and laboratory findings. Each death report of kids at BLRIGF usually consisted of necropsy findings and occasionally laboratory findings made by the Animal Health Research Division (AHRD), Bacteriology laboratory of Bangladesh Livestock Research Institute (BLRI). Faecal samples were examined microscopically for parasitic detection. The bacteriological investigation of the randomly collected swabs and tissue samples of dead kids and milk samples from doe were examined.

The epidemiological factors thought to be associated with kid morbidity and mortality was divided into three main groups *viz*. (1) Kid level factors: sex and age, (2) Management factors: kid housing, feeding (colostrums & milk) and preventive medicine, and (3) Seasonal factors: months and seasons.

Pure culture of different bacteria was prepared from collected samples by standard routine laboratory methods by using different media. Identification of each of the bacterium was based on the morphological, cultural, colony characteristics, Gram's Staining and bio-chemical tests including haemolytic activity, Catalase test and Coagulase tests as described in ref [3 and 23]. Sensitivity of the isolated bacteria to different antibiotic were studied mostly on blood agar plates using the commercial standardized antibiotic dices (Sanofi Diagnostics Pasteur, 9243 Marnes-La-Coquettes, France)

2.1 DATA ANALYSIS

Morbidity number was the total number of kids that became sick and mortality was calculated by the total number of the death of those sick kids of individual category. Mortality rates were calculated by dividing the number of total mortality by total morbidity of specific category of cause. The morbidity and mortality rates as percentage or number were calculated for the three age groups *viz* (a) Birth to 30 days (b) 31 to 90 days, and (c) 91 to 180 days. The year was divided into three seasons based on meteorological data namely (a) Summer (March to June), (b) Rainy (July to October) and (c) Winter (November to February).

The differences of morbidity and mortality rates between breed, sex, age and seasons were analyzed statistically with the help of Chi-square test [5] for significance.

3 RESULTS

Epidemiological, clinical and laboratory methods were applied to study the morbidity and mortality among 415 Black Bengal kids of BLRIGF and 220 ids from rural management are tabulated here in Table 1, Table 2 and Table 3.

3.1 KID LEVEL FACTORS

3.1.1 SEX DIFFERENCE

No significant fluctuations were observed on the morbidity (male 53.02% and female 53.50%) and mortality (male 16.28% and female 13.00%) of two sexes of Black Bengal kids (Table 4). Almost similar results were also observed under rural management (Table 4).

3.1.2 AGE DIFFERENCES

The overall morbidity and mortality rates in different age groups revealed that both the morbidity and mortality rates were found significantly ($p<0.01$) higher in 0 to 30 days (morbidity 42.17% and mortality 18.29%) in comparison to 31 to 90

days (morbidity 31.81% & mortality 13.64%) and 91 to 180 days (morbidity 26.02% & mortality 10.19%) age groups of kids at BLRIGF (Table 1). In other words, the maximum mortality occurred during the first 30 days (first month of age), then it declined to nearly half during 31 to 90 days (2^{nd} month) and further it reduced during the 91 to 180 days (4^{th} to 6^{th} months) under farm condition. These findings were in conformity with the observations of Speicher and Hepp [19]. Singh and Singh [18] who were working with calves. Similarly, higher incidence of overall clinical diseases were recorded in aged between 0 to 30 days (42.17%) and 31 to 90 days (31.81%) in comparison to higher age group of 91 to 180 days (26.02%) but the difference was not significantly significant at BLRIGF (Table 1)

3.2 MANAGEMENT FACTORS

The status of kid management, kid housing, feeding and nutrition, and preventive aspects of BLRIGF were evaluated. These included pooled colostrums, and milk feeding, limited grazing, deworming with antihelminthes, and immunization against certain infection diseases. The open pail (bucket) feeding with inadequate or improper disinfections insufficient supply of milk, and improper feeding of colostrums have been recognized to be the important farm level risk factors for causing higher morbidity and mortality rates of kid at BLRIGF. These observations are in support with Roy [15] in calves. Insufficient supply of milk through open pail (bucket) feedings to multiple kids resulted sucking lips, tongue, and loose skin on the body surface to each other which might have an important farm level risk factor for high morbidity and mortality rates. The main cause is that several important etiological agents may be shed by kids in saliva. Open pail or nipple feeds may also facilitate spread of organisms among calves [12] and so it is possible against kids.

Table 1. Age wise Morbidity (MB) and Mortality (MT) rates of kids caused by different diseases under farm condition

S/N	Diseases	0-30 days (n=175)		31-90 days (n=132)		91-180 days (n=108)		Total (n=415)	
		MB	MT	MB	MT	MB	MT	MB	MT
1	Fever	03	-	12	-	06	-	21	-
2	Inappetance	01	-	01	-	-	-	02	-
3	Constipation/Impaction	04	01	04	-	02	01	10	02
4	Bloat	03	01	05	02	03	02	11	05
5	Diarrhoea	30	05	20	02	14	-	64	07
6	Dysentery	03	01	04	-	-	-	07	01
7	Aspiration pneumonia	20	10	20	05	20	03	60	18
8	Pneumonia	30	03	25	07	23	03	78	13
9	Pneumo-enteritis	20	04	20	02	27	02	67	08
10	Eye disease	18	-	10	-	03	-	31	-
11	Colibacillosis	08	02	-	-	-	-	08	02
12	Skin diseases	20	-	11	-	10	-	41	-
13	Congenital defects	10	03	-	-	-	-	10	03
14	Undiagnosed	05	02	-	-	-	-	05	02
Total		175	32	132	18	108	11	415	65

n= no. of kid population

It appear from table 6 that 66.18% new born kids (NBK) under rural condition are deprived from first colostrum of their mother because first colostrum are usually thrown on the river or pond water or the grasses with the believe that it would be toxic to the NBK, and this practice would help to increase milk production in kids. Another detrimental effect of pail feeding colostrums and milk is that NBK were struggling to learn how to drink from the open pail.

Table 2. Age wise Morbidity (MB) and Mortality (MT) rates of kids caused by different diseases under rural management

S/N	Diseases	0-30 days (n=98)		31-90 days (n=78)		91-180 days (n=64)		Total (n=240)	
		MB	MT	MB	MT	MB	MT	MB	MT
1	Fever	03	01	02	01	03	01	08	03
2	Inappetance	02	-	02	-	01	-	05	-
3	Constipation/Impaction	05	01	06	02	03	01	14	04
4	Bloat	01	-	01	-	01	-	03	-
5	Diarrhoea	02	-	01	-	01	-	04	-
6	Dysentery	04	02	06	02	08	03	18	07
7	Aspiration pneumonia	10	04	06	03	05	02	21	09
8	Pneumonia	07	01	04	02	-	01	11	04
9	Pneumo-enteritis	10	06	05	02	04	01	19	09
10	Eye disease	06	01	01	-	01	-	08	01
11	Colibacillosis	04	02	-	-	-	-	04	02
12	Skin diseases	10	-	10	01	12	-	32	01
13	Congenital defects	09	02	-	-	-	-	09	02
14	Indigestion	10	04	25	08	20	09	55	21
15	Mobil poisoning	02	01	01	-	-	-	03	01
16	Foot and Mouth Disease (FMD)	02	01	01	-	01	01	04	02
17	Rabies /Dog Bite	02	01	01	-	04	01	07	02
18	Predator	05	03	03	02	-	-	08	05
19	Burn	02	01	01	-	-	-	03	01
20	Undiagnosed	02	01	02	01	-	-	04	02
Total		98	32	78	24	64	20	240	76

n= no. of kid population

Suckled calves have been shown to absorb Immunoglobulin (Ig) more effectively than calves removed from their dams and hand fed [16, 17, 21) and similar results for kids. Low calf serum Ig levels have been related to both higher morbidity and mortality [2, 9, 10, 16, 17] and this was happened in this case.

At BLRIGF, each of the kid was dosed with fenbendazole (peraclear-Techno-drugs) at 5mg/kg of body weight orally once at two month interval for the prevention of gastro-intestinal nematode infections but no similar attempt has been practiced in kids maintained under rural condition in Bangladesh. As a result, all the collected faecal samples from BLRIGF were found negative for parasitic infection.

Table 3. Comparative pattern of occurrence of diseases in kids maintained under farm condition and rural management

S/N	Diseases	Farm condition		Rural management		Proportion	
		MB	MT	MB	MT	MB	MT
1	Fever	21	-	08	03	1:0.38	-
2	Inappetance	02	-	05	-	1:2.5	-
3	Indigestion	-	-	55	21	-	-
4	Constipation	10	02	14	04	1:1.4	1:2
5	Bloat	11	05	03	-	1:0.27	-
6	Diarrhoea	64	07	04	-	1:0.06	-
7	Dysentery	07	01	18	07	1:2.57	1:7
8	Aspiration pneumonia	60	18	21	09	1:0.35	1:0.5
9	Pneumonia	78	13	11	04	1:0.14	1:0.31
10	Pneumo-enteritis	67	08	19	09	1:0.28	1:1.13
11	Eye diseases	31	-	08	01	1:0.26	-
12	Colibacillosis	08	02	04	02	1:0.5	1:1
13	Skin diseases	41	-	32	01	1:0.78	-
14	Congenital defects	10	03	09	02	1:0.9	1:0.67
15	Mobil poisoning	-	-	03	01	-	-
16	Foot and Mouth Disease (FMD)	-	-	04	02	-	-
17	Rabies /Dog Bite	-	-	07	02	-	-
18	Predator	-	-	08	05	-	-
19	Burn	-	-	03	01	-	-
20	Undiagnosed	05	02	04	02	1:0.8	1:1

3.3 SEASON FACTORS

The kid morbidity rate was found significantly ($p<0.01$) higher during Rainy season (72.37%) in comparison to winter (52.40%) and summer (41.50%) under farm conditions (Table 5). However, the kid mortality rate was found significantly higher during summer (18.03%) in comparison to winter (13.70%) and rainy seasons (10.12%) under farm condition (Table 5). The highest kid morbidity and mortality rate in Rainy season and Summer respectively support the findings of Srivastava *et al*. [20] and Debnath *et al*. [4] who reported higher morbidity rates of calves is the monsoon season. Unhygienic condition of kid house and its surroundings accompanied with reduced feed supply and frequent fluctuation of climatic condition might have been responsible for higher morbidity and mortality rates of kids.

Table 4. Sex wise Morbidity and Mortality under both farm condition and rural management

Condition	Sex	Morbidity		Mortality	
		No	%	No	%
Farm condition	Male	114 out of 215	53.02	35 out of 215	16.28
	Female	107 out of 200	53.50	26 out of 200	13.00
Rural management	Male	68 out of 130	52.31	25 out of 130	19.23
	Female	60 out of 110	54.55	18 out of 110	16.36

3.4 ETIO-EPIDEMIOLOGY

13 types of kid diseases and disorders were diagnosed under farm condition (Table 1) and 19 types under rural conditions in Bangladesh (Table 2). It appears from these tables that gastro-enteritis and respiratory diseases were the most common ailments associated with mortality of kids but the higher incidence rate of aspiration pneumonia (50.00%) and pneumo-enteritis (20.00%) were recorded in kids at BLRIGF which were not observed in kids maintained under rural conditions. This different disease pattern may be due to difference in management and feeding practices in kids.

The etio-epidemiological relationship of bacterial causes is presented in Table 7. Four typical bacteria *viz Escherichia coli, Staphylococcus* spp., *Bacillus* spp., *Streptococcus* spp. were isolated and identified from milk of randomly selected 20 alive doe and three randomly selected dead kids respectively.

Table 5. Season wise kid morbidity and mortality under farm condition

Parameter	Summer (March-June) (n=294)		Rainy (July–October) (n=257)		Winter (November-February) (n=292)	
	No	%	No	%	No	%
Morbidity	112	41.50	186	72.37	153	52.40
Mortality	53	18.03	26	10.12	40	13.70

n= no. of kid population

Bacteriological examination of milk samples of selected doe, which were used for feeding to kids revealed that *Staphylococcus* spp. had highest infection with 65.00% (Table 7). Therefore, it clearly indicates that the feeding of infected raw milk to the pre-weaned kids could be the main source of infection for both high morbidity and mortality in kids at BLRIGF. Although no attempt has been made to isolate viral agent from these dead kids but bacteriological results of this study indicates that mixed bacterial infection with *E. coli,* Staphylococcus spp., *Bacillus* spp. and *Streptococcus* spp. might be the cause of high morbidity and mortality in kids.

Table 6. Feeding status of colostrums to new born kids (NBK) under rural management system in Bangladesh

S/N	Colostrums feeding status	New born kids		
		No	%	
1	Kids sufficiently fed colostrums	80	29.41	
2	Kids partially fed colostrums	110	40.44	66.18
3	Kids without colostrums	70	25.74	
4	Unknown (purchased animal)	12	4.41	

Data collected from the owner during recording the disease history and prescribing the treatment of sick kids.

3.5 ASSESSMENT OF ECONOMIC LOSSES

The economic loss due to morbidity and mortality of kid has been calculated. The average value of one month old crossbred calf is assumed to be US $ 12.8 per calf, and the veterinary services and the drug cost along per calf is $ 0.40 [13]. The annual economic loss due to kid morbidity and mortality at BLRIGF has been estimated to be TK. 0.38 million (US $ 6, 507.7).

Table 7. Relationship between the bacteria isolated form milk samples (used for feeding to kids) and tissue samples of dead kids

S/N	Organisms	Milk samples of 20 alive doe		Tissue samples of three dead kids		
		No. of positive	%	Kid-1	Kid-2	Kid-3
1	*Staphylococcus* Spp.	13	65.00	+	+	+
2	*Escherichia coli*	09	45.00	+	-	+
3	*Bacillus* spp.	03	15.00	-	+	-
4	*Streptococcus* spp.	02	10.00	-	-	-

4 CONCLUSION

Black Bengal Goat is very much potential and economic livestock of Bangladesh. The observation from this study on economic losses caused by kid morbidity and mortality in Bangladesh could not be compared due to lack of similar inland report. From this research, it is clear that some common diseases and bacteria are responsible for high morbidity and mortality in kids at BLRIGF and local rural area of Bangladesh. So results of this study will help to minimize the morbidity and mortality of kids in Bangladesh.

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SMS banking using Cell phone

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ABSTRACT: SMS banking which is a technology enabled services to its customers, permitting them to operate selected banking services over their mobile phones. To implement this system, "SMS Banking Using Cell Phone" a GSM Phone is connected by a data cable to a computer. The system will receive SMS from customers via GSM phone. The received message will be saved into a table in the database automatically. The message is to be read and compare with the criteria to the database record and manipulate the desired result. Then the result is automatically sent to the customer Phone and the update record is saved to the database. With this system the customer can create an account, see the balance, transfer balance to another account and can take various help through SMS and much more. The proposed system will add a new convenience to online banking services. With the contributions of this work the customers remain connected with the bank more closely- anywhere and anytime, just sending SMS and receive all pull and push services instantly. The data transmission will be held using Mobile Phone Network. The mobile interfaces to the PC by the data cable through communication port. To develop the system we used Visual Basic and MS SQL server on the Windows Platform.

KEYWORDS: Information on demand services, GSM network, Mobile Banking, SMS system, Banking services.

1 INTRODUCTION

Now days of Information Technology the uses of Cellular Phone System have drastically changed our life. It has the facility of easy portability and voice or SMS command remotely [2]. The Advent of cell Phone has greatly extended our information processing capabilities like SMS Banking. Short Message Service (SMS) is the transmission of short text messages to and from a mobile phone, fax machine, and/or IP address. SMS is a relatively simple messaging system provided by the mobile phone networks. SMS messages are supported by GSM, TDMA and CDMA based mobile phone networks currently in use [3]. Cell Phone has influenced organization of all types and sizes to its speed, accuracy and information retrieved capabilities. SMS banking has power and speed to eliminate many formerly tedious operations and free our Banking System in the new horizon. The mobile banking system has potential to provide access or delivery of very specific and highly necessary information to customer as given in [4]. Growth in the Mobile Banking is driven by various facilities like the convenience of banking operations, greater reach to consumers and Integration of other m-commerce services with mobile banking. In Mobile banking there is no place restriction, it is high penetration coefficient as the growth of mobile phones is more than computers, it is fully personalized and private increasing transaction authenticity and is available all the time with users.

In the recent years, many programmers are trying to develop Software that includes Mobile Phone SMS (Short Message Service) command throughout the world. This task is partially done in Europe and America. The proposed work entitled as "SMS Banking Using Cell Phone" is a step to develop such system that will include SMS commands.

The system will be very important because the proposed system:

- Provides Banking System in the grief.
- Saves Money and time to take banking services.
- Provides human being a luxurious life.

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- Enhances the working speed of the application users.
- Facilitates the physically disabled person to use computers.
- Provides low cost and high performance

2 PROPOSED SYSTEM

The proposed software would provide the following banking services using Short Message Service (SMS):

- Create an account through SMS
- Balance Enquiry(Check Balance)
- View list of linked accounts
- View account history-last 3 transactions
- Check request
- Statement request
- Stop check payment
- Balance Transfer to another account
- Show the Last Transaction
- Change Password
- Help Services

3 DESIGN & IMPLEMENTATION

3.1 INTRODUCTION

In accordance with the nature and scope of SMS Banking Using Cell Phone, several program modules are written to cover all the operations. They are

- Receiving SMS from customers
- Processing the SMS (Sectioning the SMS).
- Updating Database According to receiving SMS
- Sending reply to the customer

3.2 REQUIREMENTS

For implementation of the proposed system, the hardware and software requirements are as follows-

- GSM modem.
- GSM phone.
- SMS and Pager Toolkit (ActiveXperts [1]) for receiving messages, sending messages.
- Visual Basic Programming Language.
- Microsoft SQL server for creating/updating databases.

3.3 IMPLEMENTATION

The Program consists of several parts. The system design block diagram and flowchart are given below:

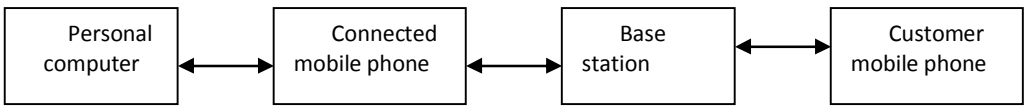

Fig. 1. System block diagram

The system implementation Flowchart given below:

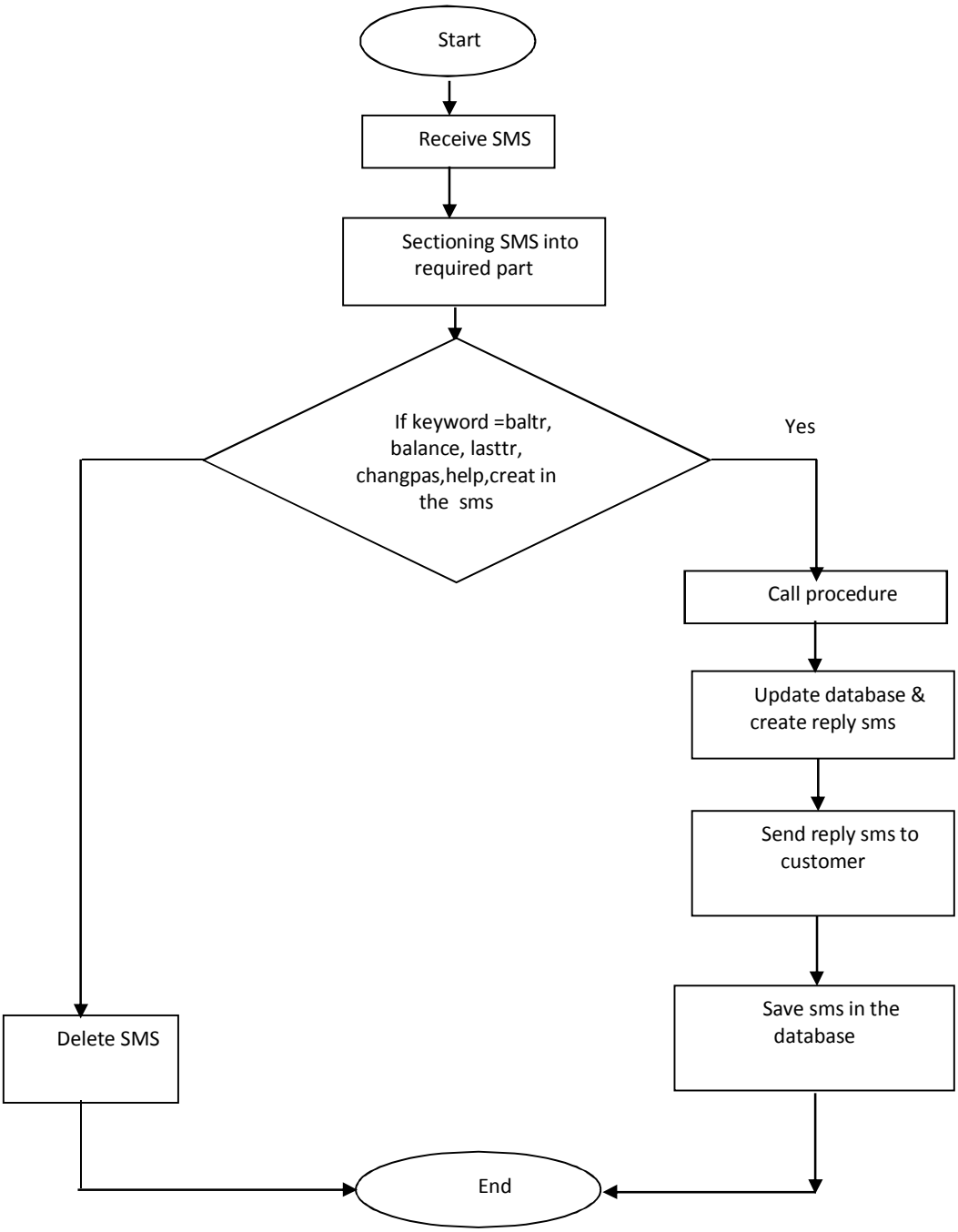

Fig. 2. Flowchart of the system

3.4 SMS RECEIVING METHOD

In the complete developed system any customer can know his account balance by sending SMS to the computer connected mobile number and within a short time he will get back a message about his balance. This reply message may be produced either manually or automatically. For this purpose we proposed a way of interfacing the computer and cell phone.

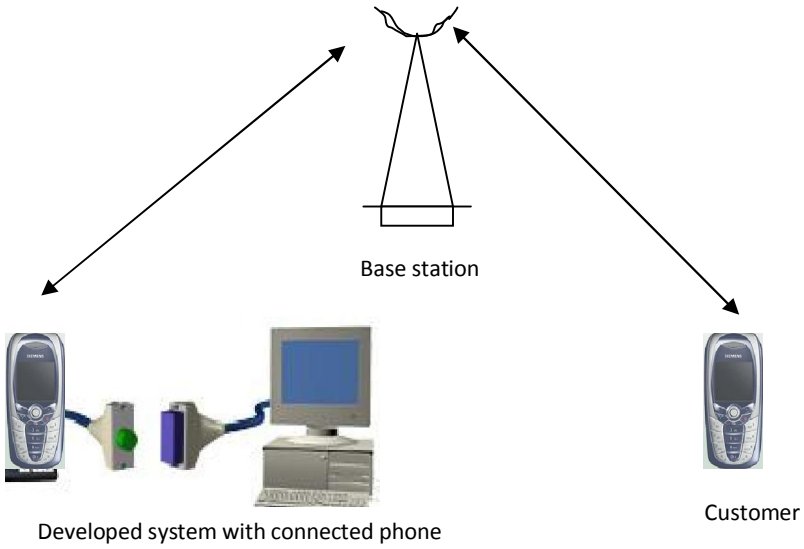

Fig. 3. Data transmission system

We connected a mobile phone in the one side of the data cable and the other side is connected to the computer main board USB port (COM3). This hardware is now combined with different software and the system will do proper work. When any customer sends SMS, the SMS received by the developed system via computer connected phone directly for processing.

The following sample demonstrates how to receive an SMS message using a GSM modem (or modem-capable GSM phone):

```
Set objGsmIn = CreateObject("ActiveXperts.GsmIn")
Set objConstants = CreateObject("ActiveXperts.SmsConstants")
objGsmIn.Device = "COM3"
objGsmIn.EnterPin ("1234")
‘ SIM cards PIN number
objGsmIn.Storage = objConstants.asSTORAGE_DEVICE
objGsmIn.DeleteAfterReceive = True
‘message deleted after receive
objGsmIn.Receive
‘ receiving message
objGsmIn.GetFirstMessage
        While (objGsmIn.LastError = 0)
                objGsmIn.GetNextMessage
        While end
Text1.Text = objGsmIn.MessageData
‘ incoming mesaage directly come to text1
Text2.Text = objGsmIn.MessageSender
‘ customer phone number to text2
```

3.5 SMS MANIPULATION & DATA PROCESSING

The received SMS manipulation and Data processing will do in the following steps:

1. The SMS is received in the text1 in the main form.
2. The SMS sectioned under some criteria as under:

   If the word “balance” in the incoming SMS

   Then the SMS will section into 2 parts

   If the word “baltr” in the incoming SMS

   Then the SMS will section into 5 parts

   If the word “creat” in the incoming SMS

   Then the SMS will section into 10 parts

   If the word “help” in the incoming SMS

   Then the SMS will save without sectioning
3. For Balance the SMS sectioned into two parts: balance and account no. and search with the account number, then send a back SMS to the customer.
4. For balances transfer the SMS sectioned into five parts: baltr, customers account no, customer password, accounts no to be transfer, and amount. First check customers account. No. if found, then check password, then check amount to be transfer. If everything is right then update the database and send back SMS to the customer.
5. If any wring in the SMS such as keyword, account no., password, amount, and the system will send a SMS to customer with the information about the wrong.

3.6 SMS SENDING METHOD

After processing and updated database with accordance of the customer’s demand, the sending message is created and sends to the customer.

The following sample demonstrates how to send an SMS message using a GSM modem (or modem-capable GSM phone):

```
Set objGsmIn = CreateObject("ActiveXperts.GsmIn")
Set objConstants = CreateObject("ActiveXperts.SmsConstants")
Set objGsmOut  = CreateObject( "ActiveXperts.GsmOut" )
ObjGsmOut.Device = "COM3"
 objGsmOut.MessageRecipient = "cell phone number"
' Recipient's mobile number
objGsmOut.MessageData = "Hello, world!"
' SMS message text
objGsmOut.RequestStatusReport = False
' No request for status report
objGsmOut.ValidityPeriod = 0
' Use GSM operator's default retry time
  objGsmOut.EnterPin ( "1234" )
' SIM card's PIN code
objGsmOut.Send()
If objGsmOut.LastError = 0 Then
```

```
        Wscript.Echo "Message successfully delivered."
            Else
        Wscript.Echo "Error: " & objGsmOut.LastError
    End If
```

4 RESULT AND DISCUSSION

4.1 EXPERIMENTAL RESULTS AND DISCUSSION

This work was aimed to develop a short message service (SMS) based Banking system. The system was tested with several SMS (six of which are given below) sending to a specific phone number which was connected to the computer and within few second the reply was received by the customer phone, and then the database was updated within that time. The percentage of accuracy rate of getting a reply and updating database has been calculated using the following equations:

$$\text{Percent of accuracy} = \frac{\text{No. Of reply}}{\text{No. Of Receiving SMS}}$$

Table 1. Receiving & sending SMS with SMS format

No	Services	Receiving Message	Sending Message
1	For balance show	<keyword><space><acc no>Balance 1113	Nane: Rofiq acc: 1113 BL:5000
2	For balance transfer	<keyword><sp><acc><sp><pass> <sp><acc to ransfer><amount> Blatr 1113 333333 1112 100	Tk. 100 Successfully transfer to 1112
3	For last transaction	<keyword><sp><acc> Lasttr 1113	Withdraw tk. 100 to 1112
4	For deposit	<keyword><sp><acc><card no> Deposit 1113 3333333333333	Updated acc addinh tk.5000
5	Change password	<keyw><sp><acc><sp><old pass><sp><new pass> Changepass 1113 333333 666666	Password change to 666666
6	For help	<key><sp><question> Help <question>	Call to a specific mobile number.

4.2 LIMITATIONS OF THIS SYSTEM

- The message must be according to the instruction of the system
- Only for help customer can send message willingly but must be within 160 characters.
- Data cable connections are very sensitive.
- Due to congestion the reply may be delayed.
- If a battery has no charge receiving and sending message is stopped.
- Mobile network surrounded in limited zone, so out of network this system failed to serve customers.

4.3 CONCLUSION AND FUTURE WORK

Most of the people are involved in the banking system for money transactions, so it is extremely important for banking section to provide effective and timely services to the customers concerning general banking. This paper introduces an approach for implementing such services quickly through a low cost computer application. The application uses the Short Message Service (SMS) feature that is widely available on every mobile phone, which makes it one of the most efficient methods of communication.

Actually the developed system gives an introductory idea about SMS Banking. As the field of mobile communication is a rapidly increasing field several improvements and investigations can be made in this field of Banking in the fast and secured manner. By studying this work it is possible to give more services in the banking sector.

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Relation gouvernance et croissance économique: Un essai de modélisation par application au cas de la Tunisie

[Relationship between governance and economic growth: A modeling test by application to the case of Tunisia]

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ABSTRACT: The purpose of this article is, by using a Vector Error Correction Model (VECM) applied to the case of Tunisia, to highlight the possible relationship of governance with economic growth. Indeed, considered as the way by which power is exercised in the management of economic and social resources of a country, several empirical studies have attempted to identify the relationship between the governance and the economic growth of a country. The majority of works were in the form of cross-section studies, without considering the time dimension. Similarly, the works usually based in the construction of the quality of the governance of a country on some components without taking into account all the qualities mentioned. Indeed, using a database of various official organizations, we have tried to build an aggregate indicator, supposedly apprehend the quality of Tunisian institutions. Certainly, it turned out from the various tests and investigations carried that a causal relationship exists between governance and economic growth. In other words, like the governance affects growth, the latter in turn has an effect on the quality of the institutions of the country.

KEYWORDS: Governance, economic growth, VECM model, causal relationship, Tunisia.

RESUME: Le but de cet article est d'essayer, à partir de l'approche d'un Modèle Vectoriel à Correction d'erreur (VECM) appliqué au cas de la Tunisie, de mettre en évidence l'éventuelle relation de la qualité de gouvernance avec la croissance économique. En effet, considérée comme la manière par laquelle le pouvoir est exercé dans la gestion des ressources économiques et sociales d'un pays, plusieurs travaux empiriques ont tenté d'identifier la relation de la gouvernance avec la croissance économique d'un pays. Mais, la majorité des tentatives étaient sous forme d'études en coupe transversale, sans tenir compte de la dimension temporelle. De même, les travaux reposent généralement dans la construction de la qualité de gouvernance d'un pays sur quelques sous composantes, sans tenir compte de la totalité des qualités évoquées. En effet, en utilisant une base de données relative à différentes organisations officielles, nous avons essayé de construire un indicateur agrégé, supposé appréhender la qualité des institutions tunisiennes. Certes, il s'est avéré à partir des différents tests et investigations effectués, qu'une relation causale existe entre la gouvernance et la croissance économique en Tunisie. En d'autres termes, comme la gouvernance affecte la croissance, cette dernière exerce à son tour un effet sur la qualité des institutions du pays considéré.

MOTS-CLEFS: Gouvernance, croissance économique, modèle VECM, relation causale, Tunisie.

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1 INTRODUCTION

Utilisée de façon normative par les organismes de prêt internationaux, pour désigner les institutions, les pratiques et les normes politiques nécessaires à la croissance et au développement économique des pays emprunteurs, la gouvernance n'est pas un nouveau concept. Certes, l'accent est mis depuis au moins deux décennies sur la notion de " bonne gouvernance", comme facteur déterminant du développement économique et social. Elle a été introduite dans les programmes des organismes internationaux de financement. En effet, des réformes institutionnelles ont été préconisées au côté des programmes économiques néo-libéraux. Ces réformes ont été promues non pas pour que s'affirment les considérations sociales et politiques sur l'économique, mais bien pour rendre ces programmes plus efficaces. La focalisation ne se fait plus sur les techniques de préparation des plans de développement, mais sur la nature des systèmes socioéconomiques en place et la logique de leur fonctionnement, sources de corruption et d'inégalités, etc.

En général, la gouvernance est considérée comme la manière par laquelle le pouvoir est exercé, dans la gestion des ressources économiques et sociales d'un pays, au service du développement [1]. Elle doit comprendre au minimum l'obligation des gouvernants de rendre compte aux gouvernés la transparence, le respect des lois, ainsi que des systèmes politiques, qui encouragent la participation des populations au processus de prise de décision [2]. Sur un autre plan, la gouvernance semble emprunter les hypothèses et le cadre microéconomique de la Nouvelle Economie Institutionnelle (NEI), de la théorie des choix publics, et d'autres chemins théoriques convergents entre eux. Dans ce cadre, elle s'inscrive dans le paradigme fonctionnaliste de l'efficience et de la répartition de la valeur par l'organisation [3], pour se définir comme l'exercice de l'autorité publique, économique et administrative dans le cadre de la gestion des affaires d'un pays.

Certes, une large littérature s'est déjà construite pour montrer l'importance des institutions dans la détermination des performances économiques de long terme, tant sur le plan théorique que sur le plan empirique ([4], [5], [6], [7], [8], [9]). Dans ce cadre, [10] affirme qu'une meilleure gouvernance entrainerait des dividendes à la fois en termes de croissance économique et de développement social. De même, [11] en appréhendant la qualité de gouvernance par la lutte contre la corruption, la protection des droits de propriété, la participation et la responsabilisation, confirment l'effet positif de la bonne gouvernance sur le Produit Intérieur Brut (PIB) d'un pays. D'autres chercheurs ([12], [13]) stipulent que l'effet des institutions publiques de qualité, sur les performances en matière de développement, supplante largement l'effet de bonnes politiques économiques. D'après notre connaissance, la majorité des travaux empiriques qui cherchent à identifier la relation entre la gouvernance et la croissance économique, étaient sous forme d'études en coupe transversale, sans tenir compte de la dimension temporelle. De même, les études effectuées reposent généralement dans la construction de la qualité de gouvernance sur des sous-composantes, sans tenir compte de la totalité des qualités évoquées. Pour cette raison la tentation est grande, où nous essayons à partir du cas du pays de la Tunisie, de surmonter ces lacunes empiriques, et ce en construisant un indicateur agrégé de la gouvernance, tout en identifiant la nature de sa relation avec la croissance du pays considéré.

2 L'INDICATEUR DE GOUVERNANCE AGRÉGÉ : UN ESSAI DE CONSTRUCTION

Nombreux sont les indicateurs qui essayent d'appréhender la qualité de gouvernance d'un pays. Selon Freedom House (FH), la gouvernance est saisie par les indicateurs de droits politiques (ILP) et des libertés civiques (ILC). Ces derniers donnent à la population le droit de participer à la vie politique, à la formulation des décisions, à choisir ses représentants en toute liberté et à s'exprimer librement. Ils garantissent, en outre, le respect de la règle de droit et des droits de l'homme ainsi que la qualité des chances et d'accès pour tous les citoyens. Pour la Banque Mondiale (BM), la qualité de gouvernance d'un pays devrait tenir compte de la corruption (CO), l'autorité de droit (AD), l'efficacité du gouvernement (EG), le taux d'investissement (TIF), le niveau d'inflation (INF), le taux de pression fiscale et les dépenses de l'État (D).

Dans notre analyse, nous essayons de construire un indicateur agrégé de la gouvernance, tout en tenant compte des différents indicateurs évoqués par la BM et le FH. Nous utilisons la moyenne arithmétique des différents indicateurs, pondérés par leurs écarts types, comme méthode d'agrégation, vu qu'elle permettra d'éliminer le problème d'hétérogénéité des indicateurs utilisés. En l'occurrence, par l'application de la technique de l'Analyse en Composante Principale (ACP), il s'est avéré que les sous-indicateurs utilisés dans la construction de l'indicateur agrégé de la gouvernance, permettent d'expliquer plus de 80% de la variance totale de ce dernier, où nous avons obtenu l'équation de la variance associée à l'axe principal, avec les contributions suivantes :

$$\text{Contribution (Fact1)}=0.17*ILP+0.17*ILC+0.199*CO+0.203*EG+0.209*AD-0.032*TIF-0.052*INF+0.158*D \quad (1)$$

Certes, de telle contributions observées dans l'explication de l'indicateur agrégé de la gouvernance, confirme la pertinence des sous indicateurs utilisés dans la construction de la gouvernance globale. Sur la base de cette estimation, nous

pouvons commencer notre identification de l'éventuelle relation entre la qualité de gouvernance et la croissance économique. Ce qui fait l'objet de la section suivante.

3 CROISSANCE ET GOUVERNANCE : UNE SPÉCIFICATION DU MODÈLE À ESTIMER

Notre point de départ est la fonction de production Cobb-Douglass du modèle de croissance endogène de [14]:

$$Y_t = K_t^{\alpha} H_t^{\beta} (A_t L_t)^{1-\alpha-\beta} \quad (2)$$

$$L_t = L_0 e^{nt} \quad (3)$$

$$K_t = I_t + (1-\delta) K_{t-1} \quad (4)$$

Avec, Y comme Produit Intérieur Brut (PIB) réel, K, le stock de capital fixe, H, le stock de capital humain, L, le facteur travail, A, le niveau de la technologie. Nous supposons que α+β =1 c'est-à-dire, que les facteurs de production sont rémunérés a leurs productivité marginales.

Le niveau de la technologie est exprimé par la fonction suivante :

$$A_t = A_0 e^{gt+p\theta} \quad (5)$$

Où, g est le taux de croissance exogène du progrès technologique, p est un vecteur des variables institutionnelles qui peuvent affecter le niveau de la technologie et ϑ, le vecteur des coefficients reliant ces variables.

En rapportant l'équation (2) par le facteur travail, nous obtenons l'équation de la production par tête suivante :

$$y_t = A_t (k_t)^{\alpha} (h_t)^{\beta} \quad (6)$$

En appliquant le logarithme à l'équation (6) et en remplaçant les variables L_t, $K_t$et A_t par leurs équations, nous obtenons le modèle suivant, qui met en évidence la relation entre la qualité des institutions et le produit par tête :

$$\ln(y) = \alpha_0 + \alpha_1 IGG + \alpha_2 \ln(k) + \alpha_3 \ln(n+g+\delta) \quad (7)$$

Certes, notre étude utilise des données annuelles relatives à la période 1996-2009. Pour cette raison, avant d'établir l'estimation, une série de tests devront être élaborés pour spécifier la forme optimale de l'équation. En effet, on va commencer par utiliser le test de stationnarité de racine unitaire plus précisément, le test d'Augmented-Dukey-Fuller (ADF). Ce test spécifique à des séries temporelles permet de vérifier si le modèle est de type TS (trend Stationnary) ou DS (Differency Stationnary). Les résultats de ce test sont affichés dans le tableau (1).

Tableau 1. Test ADF sur les séries à niveaux et en Différence première

Variables	Nbre de Retard	Test D'ADF en Nivaux		Stationnarité	Cte	trend
		Valeur Critique	Valeur Statistique			
PIB/h	1	-3.828975	-1.879873	Non	Non	Oui
K	1	-1.970978	2.381964	Non	Non	Non
L	1	-3.144920	-2.294761	Non	Oui	Non
IGG	1	-1.970978	-1.584863	Non	Non	Non

La comparaison des valeurs statistiques de chaque série par les valeurs critiques montre que, à l'exception du PIB/h, tous les processus sont des DS c'est-à-dire, des processus non stationnaires, sans constante ni tendance. Donc il y a un risque de cointégration, et on a peut être à estimer un modèle à Correction d'erreur (MCE). En effet, puisque les séries sont toutes intégrées d'ordre 1, on peut les modéliser selon un modèle VAR(p). À cette fin, nous avons estimé divers processus VAR pour des ordres de retard p allant de 1 à 2 (à cause du nombre d'observation très réduit (11 années)). Pour chaque modèle, nous avons calculé les critères d'information d'*Akaike* (AIC), de *Schwarz* (SIC) ainsi que, la log-vraisemblance (LV). Certes, les résultats obtenus et affichés dans le tableau (2) prouvent que le processus à retenir est un processus VAR(1).

Tableau 2. Nombre de retard à retenir

	1	2
Akaike Info Criterion	-17.93088	-17.96723
Schwarz Info Criterion	-17.06173	-17.869
Log Likelihood	136.5507	117.343

Maintenant, il serait nécessaire de vérifier l'hypothèse de cointégration, et qui sera testée par deux approches : l'approche de d'*Engle et Granger* et celle de *Johansen*. L'approche d'*Engle et Granger* est basée sur deux étapes ; La première est une estimation par la méthode des Moindres Carrés Ordinaires (MCO) du modèle de long terme et la deuxième, est un test ADF sur le résidu ε_t. Certes, l'estimation par la MCO montre que le modèle est globalement significatif (Prob(F-statistic)=0), de même pour les coefficients des variables capital et Gouvernance qui le sont (Prop(t-statistic)<0.05), à l'exception du facteur travail.

Tableau 3. Estimation de la relation de long terme

Dependent Variable: LOG_PIB_H_				
Method: Least Squares				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
LOG_L_	1.395654	0.660051	2.114464	0.0606
LOG_K_	0.467128	0.198276	2.355950	0.0402
IGG	-0.172558	0.081360	-2.120921	0.0499
C	-10.26296	2.504389	-4.097988	0.0022
R-squared	0.959780			
F-statistic	79.54397			
Prob(F-statistic)	0.000000			

Pour le Test ADF sur le résidu, les résultats présentés en Tableau 4, montrent que la valeur estimée de la statistique ADF (-1.970978) est inférieur à la valeur critique (-1.667086) au seuil de 5%. Donc l'hypothèse de stationnarité du résidu $\varepsilon_t$est acceptée. Nous en déduisons qu'il existe une relation d'équilibre à long terme entre le produit intérieur brut, le travail, le capital et l'indicateur agrégé de gouvernance. Ces variables génèrent des processus de type DS (Differency Stationnary), qui impliquent qu'un choc à un instant donné se répercute à l'infini sur les valeurs futures des séries, l'effet des chocs est donc permanent.

Tableau 4. Test d'ADF sur les variables stationnaires

Variables	**Test d'ADF sur les variables stationnaires**		**Nbre de Retard**	**Ordre d'Intégration**
	Valeur Critique	**Valeur Statistique**		
D(PIB/h)	-1.974028	-2.580049	1	I(1)*
D(K)	-1.974028	-2.245716	1	I(1)
D(L)	-1.977738	-2.098681	1	I(1)
D(IGG)	-1.974028	-4.885489	1	I(1)
*I(1)= intégré d'ordre 1				

Concernant le Test de *Johansen*, les résultats figurent dans le tableau ci-dessus :

Tableau 5. Test de JOHANSEN

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.999947	150.6786	40.17493	0.0000
At most 1 *	0.824505	32.53360	24.27596	0.0037
At most 2	0.455401	11.65186	12.32090	0.0645
At most 3	0.304611	4.359403	4.129906	0.0437
Trace test indicates 2 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

L'analyse montre que les variables log(PIB/h), log(L), log(K) et IGG sont cointégrés au seuil de 5%. L'hypothèse nulle d'absence de cointégration est rejetée vu que le test indique deux équations de cointégration. L'existence de relation de cointégration justifie l'adoption d'un modèle à correction d'erreur, conformément à la représentation suivante du modèle de Hendry:

$$D(\log(PIB_h)_t) = \beta_0 + \beta_1 * D(\log(K)_t) + \beta_2 * D(\log(L)_t) + \beta_3 * D(IGG_t) + \beta_4 * \log(PIB_h)_{t-1} + \beta_5 * \log(K)_{t-1} + \beta_6 * \log(L)_{t-1} + \beta_7 * IGG_{t-1} + \varepsilon_t \quad (8)$$

Avant de procéder à l'estimation finale, nous devons procéder à un test de détection d'éventuelle autocorrélation des erreurs. En effet, nous utilisons le test de *Breusch-Godfrey* , où nous avons obtenu les principaux résultats suivants :

Tableau 6. Test de Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.787786	**Prob. F(7,5)**	0.6273
Obs*R-squared	6.818060	**Prob. Chi-Square(7)**	0.4481
Scaled explained SS	0.675941	**Prob. Chi-Square(7)**	0.9985

Certes, l'hypothèse de non corrélation des erreurs est acceptée si la probabilité du test est supérieure à 5%. Dans notre cas, elle est de 0.44, supérieure à 5%, ce qui implique que les erreurs du modèle ne sont pas corrélées, il y a donc absence d'autocorrélation des erreurs, et le modèle est un bruit blanc. Ainsi, on peut appliquer la méthode d'estimation par la MCO sur le modèle (8), et détecter ainsi l'éventuelle relation de la gouvernance avec la croissance économique.

4 RELATION CROISSANCE ET GOUVERNANCE : APPLICATION AU CAS TUNISIEN

L'estimation de l'équation (8) nous a permis d'avoir les principaux résultats suivants :

$$D(\log(PIB_h)_t) = \beta_0 + \beta_1 * D(\log(K)_t) + \beta_2 * D(\log(L)_t) + \beta_3 * D(IGG_t) + \beta_4 * \log(PIB_h)_{t-1} + \beta_5 * \log(K)_{t-1} + \beta_6 * \log(L)_{t-1} + \beta_7 * IGG_{t-1} + \varepsilon_t$$

Tableau 7. Modèle à Correction d'Erreur

Dependent Variable: D(LOG_PIB_H_)				
Method: Least Squares				
	Coefficient	Std. Error	t-Statistic	Prob.
C	1.714814	4.639980	0.369574	0.7268
D(LOG_K_)	0.580669	0.169947	3.416761	0.0189
D(LOG_L_)	-0.516777	1.047944	-0.493134	0.6428
D(IGG)	0.007932	0.096008	0.082613	0.9374
LOG_PIB_H_(-1)	-0.051637	-0.031762	-3.162554	0.0372
LOG_K_(-1)	-0.015608	0.224715	-0.069458	0.9473
LOG_L_(-1)	-0.267015	0.904839	-0.295097	0.7798
IGG(-1)	0.145159	0.132445	1.095998	0.3230

Les coefficientsβ_1, β_2 et β_3 représentent les élasticités de court terme, alors que les élasticités de long terme sont : $-\beta_5/\beta_4$, $-\beta_6/\beta_4$,$-\beta_7/\beta_4$ .Le coefficient β_4 est le coefficient de correction d'erreur, il doit être inférieur à l'unité et négatif. Ce dernier indique la vitesse d'ajustement de la variable endogène le PIB, pour retourner à l'équilibre, suite à un choc de long terme. Autrement dit, il correspond aux stabilisateurs automatiques de l'économie. Les résultats issus de ce tableau montrent que le terme à correction d'erreur associé à la force de rappel β_4 est négatif (-0.0516) et significativement différent de zéro au seuil statistique de 5%. Il existe donc un processus de rattrapage vers la valeur d'équilibre autrement dit, un mécanisme à correction d'erreur de long terme des déséquilibres du PIB tunisien. En effet, il s'est avéré que tout déséquilibre entre le niveaux désiré et effectif du PIB en Tunisie, est résorbé au environ de 5,16% par le facteur capital , travail ainsi que la qualité de gouvernance. Une telle vitesse de stabilisation des fluctuations de l'économie tunisienne est faible, Ce qui se traduit par une persistance de l'effet du choc, qui se traduit par la volatilité des principaux agrégats macroéconomiques

Certes, l'analyse de l'élasticité de court terme du PIB par rapport au facteur capital est de 0,58 (β_1). Ce qui implique qu'à court terme, toute augmentation de 10% du facteur capital en Tunisie entraine une augmentation de 5,8% du PIB. Par contre, un effet de sens inverse est observé à long terme, où l'augmentation de 10% du facteur capital implique une diminution du PIB de 3,02%. L'impact négatif de l'investissement en capital fixe à long terme sur la croissance économique pourrait être expliqué entre autres par une mauvaise gouvernance et l'absence de règles dans la gestion des finances publiques mais surtout, par l'insuffisante accumulation du capital public et sa faible productivité. Concernant le facteur travail, il s'est avéré que ce dernier affecte négativement la croissance du PIB de l'économie tunisienne, que ce soit à court terme par une élasticité de-0,516 (β_2) où à long terme, par une élasticité de-5,171=$-\beta_6/\beta_4$ = -(-0.267015)/(-0.051637) . En l'occurrence, il s'est avéré que l'effet de la qualité de gouvernance sur la croissance du PIB de l'économie tunisienne est manifeste, surtout à long terme, avec une élasticité de 2,811=$-\beta_7/\beta_4$ = -0.145159/(-0.051637), contre 0,0079 à court terme (β_3). De même, il s'est avéré que l'amélioration de la qualité de gouvernance génère, plus précisément, à long terme, un effet positif sur la croissance économique, qui dépasse largement les autres facteurs de production. Le résultat le plus frappant est la double causalité ou la causalité bi-directionnelle entre la croissance économique et l'indicateur agrégé de la gouvernance. En effet, en procédant à un test de causalité de Granger, il s'est avéré d'après le tableau 8 que, pour un seuil de 10%, le PIB et la qualité de gouvernance en Tunisie s'influencent mutuellement.

Tableau 8. Test de Causalité au sens de Granger

NullHypothesis:	Obs	F-Statistic	Prob.
IGG does not Granger Cause LOG_PIB_H_	10	4.85486	0.0634
LOG_PIB_H_ does not Granger Cause IGG	10	3.83336	0.0911

En l'occurrence, une telle causalité de relation est confirmée par les fonctions de réponse, suite à une simulation des effets d'un choc sur les variables du modèle, pour une période de dix ans. En effet, les graphiques qui suivent retracent les réactions du PIB et du facteur travail et capital suite à un choc appliqué à la variable gouvernance et la variable PIB :

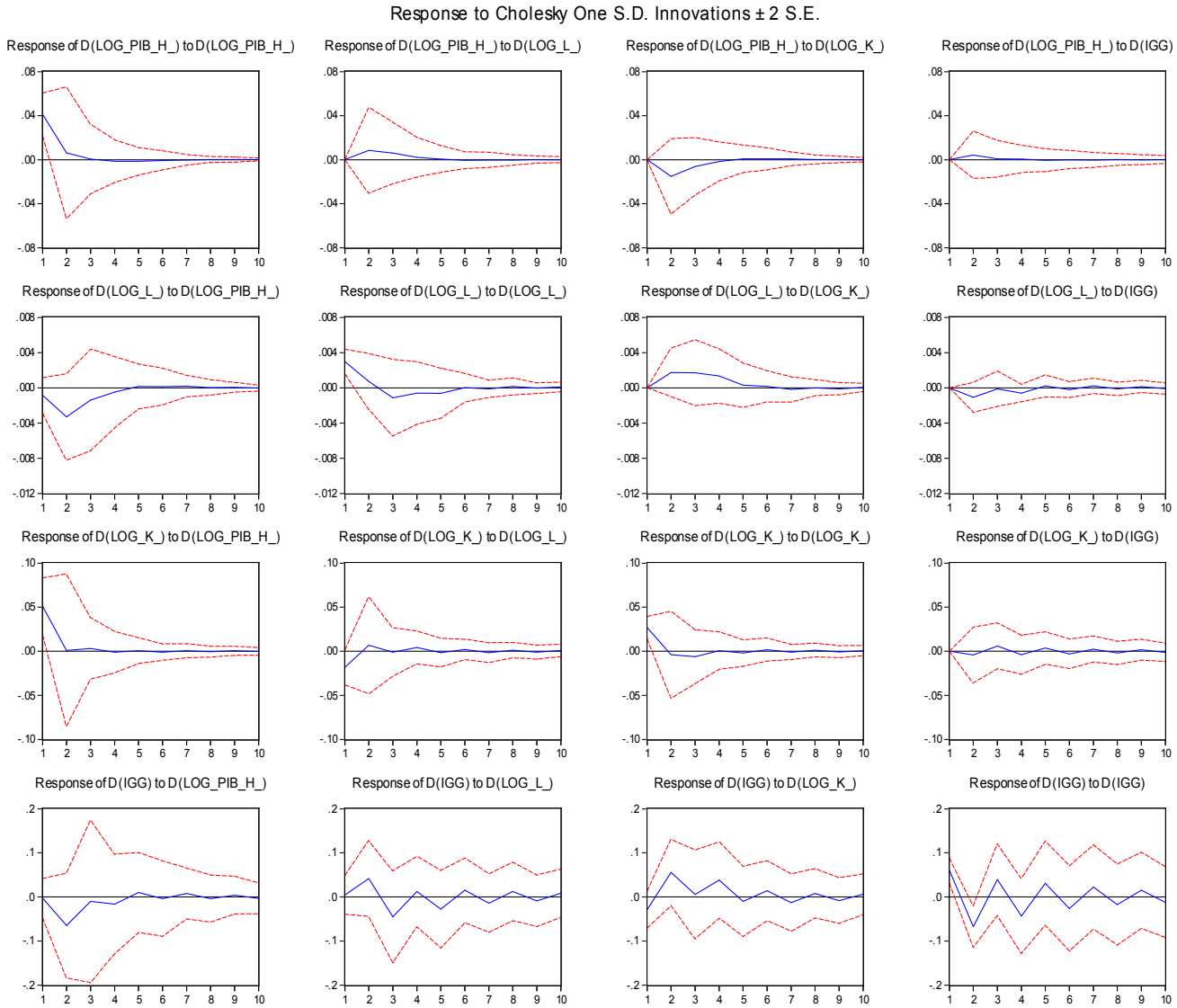

Fig. 1. Simulation des réponses des variables à l'effet d'un choc

L'analyse des graphiques stipulent qu'un choc sur la gouvernance, se traduit par des effets non instantanés sur les autres facteurs, vu que les courbes relatives aux facteurs travail et capital et au PIB ne commence pas à partir de l'origine des axes. Il s'est avéré qu'un choc de gouvernance se traduit par des effets positifs sur le PIB, essentiellement pendant la deuxième et la troisième année. De même, malgré que la réponse soit non immédiate, le choc sur le PIB affecte aussi la gouvernance, et prend effet à partir de la deuxième année. Ces analyses confirment les conclusions susmentionnées, et justifient ainsi les résultats du test de causalité à la Granger. En effet le PIB et la qualité de gouvernance de la Tunisie sont corrélés, et manifestent surtout une sensibilité à double sens. En d'autres termes, comme la gouvernance affecte la croissance économique, à son tour, cette dernière affecte la qualité des institutions du pays considéré.

5 CONCLUSION

Plusieurs travaux empiriques essayent d'examiner le lien entre la gouvernance et la croissance économiques, mais à des degrés différents. Généralement, les études évoquaient seulement une partie des qualités institutionnelles qui entrent dans la composition de la gouvernance économique. Dans notre cas, et à l'aide de données internationales, nous avons tenté d'établir une mesure agrégée de la gouvernance économique. En effet, par l'utilisation d'un modèle VECM, les investigations

effectuées confirment la présence d'une relation causale entre la qualité des institutions et la croissance économique de la Tunisie. Ces deux dernières s'influencent mutuellement.

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Banking techniques, new alternative of engineering institutions of Islamic finance, ideal vs. reality: the way forward

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ABSTRACT: The global financial crisis showed the difficulty of access to the economic and financial balance in the context of priority speculative symbolic economy. The Islamic finance, which, is characterized by the distribution of risk and avoid selling debt and risks, and the abolition of 'riba'-based transactions, and encourage contracts related to the real economy, one of the most important alternatives to contain the economic fluctuations. It is therefore incumbent on the Islamic finance industry that is keen to create new products and financial instruments embody sectarian and privacy of Islamic economics, and interact with the developments in the banking and financial framework 'Sharia'. And the actual needs of the real economy, including allowing the evolution of the economic balance of Islamic finance. If the products of the Islamic financial industry just a reformulation of the traditional financial products; the result ultimately threatens the balance and economic stability.

KEYWORDS: Islamic finance, financial instruments, banking, Sharia, economy.

JEL: G01, G21, G23, G24, G30.

1 INTRODUCTION

The principle of the Islamic banking system is the principle of participation in the profits and losses among banks and among depositors according to certain rules predefined [1], and specifically will not get the applicant to ensure that yield a predetermined nominal value of 'Odiath' in the bank., But it will be treated 'asif' the bank's shareholders and thus is entitled to share in the profits generated by this bank. The system is homogeneous so involved deposited in the Bank's losses and thus lower nominal value of 'Odiath' and on the other side of the bank's balance sheet cannot bank also imposes a fixed interest rate on the loans, but he has to enter the type of arrangements [2], on the basis of participation in the profits and losses. And on the most basic level, it can be regarded as the Islamic banking system based system on the basis of equity; 'Valmouda' mainly buys shares in the ownership of the bank.

That substitution of funding to participate finance lending help to broaden the base of ownership of projects and contribute significantly to achieving the objectives of justice in the distribution of income and wealth. The funding partnership makes Islamic banks, investment banks producer of goods and services, and real development banks [3]. The funding to participate in the profits and losses helps Islamic banks to face certain types of shocks ('Ksheb' mass by depositors which loses the bank the ability to meet its obligations and be forced to close) and reason for this is that the Islamic Bank

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does not guarantee the nominal value of deposits , which makes the bank is able to absorb immediately by changes in the nominal values of the deposits held by the public at the bank as the real values of the assets and liabilities of banks in such a system will be equal at both time points.

Islamic finance relies on participation rates of various associated dynamic real economic, while Traditional financing depends on the mechanism to take interest that develop pre-symbolic economy speculative that is not linked in many cases the real economy [4],then it is one of the key factors of the crises and cyclical economic fluctuations.

It have seen the financial markets and the banking industry several developments in the form of innovations and financial products under the name of "financial engineering" that was the highlight of their results "derivatives" and securitization, is difficult task monetary and fiscal authorities in monitoring and follow-up; which led to the succession of financial [5] crises that upset stability economic. The current financial crisis showed the financial system and the traditional banking losses in financial assets, which are estimated at more than $ 60 thousand billion, and turned into an economic crisis, began a state of depression. The importance of Islamic finance emerged that connects the real economy to contain the financial economy economic and financial crises and related courses. And usability [6] will highlight the efficiency of Islamic finance in alleviating economic fluctuations.

2 Development And Maturity of the Islamic Banks

The real interest in the establishment of Islamic banks operate in accordance with the provisions of Islamic 'Sharia' in the recommendations of the Ministry of Foreign Affairs of the Islamic countries in Jeddah in Saudi Arabia. 1972 spread seminars and conferences for banks phalanx in the world, and recognition of those Western importance of this experience and the speed of its success [8], came confirmation that the IMF report, which stated that the financial system only salami based on participation in the profit and loss without taking into account the interest rate is more stable than; western financial system.

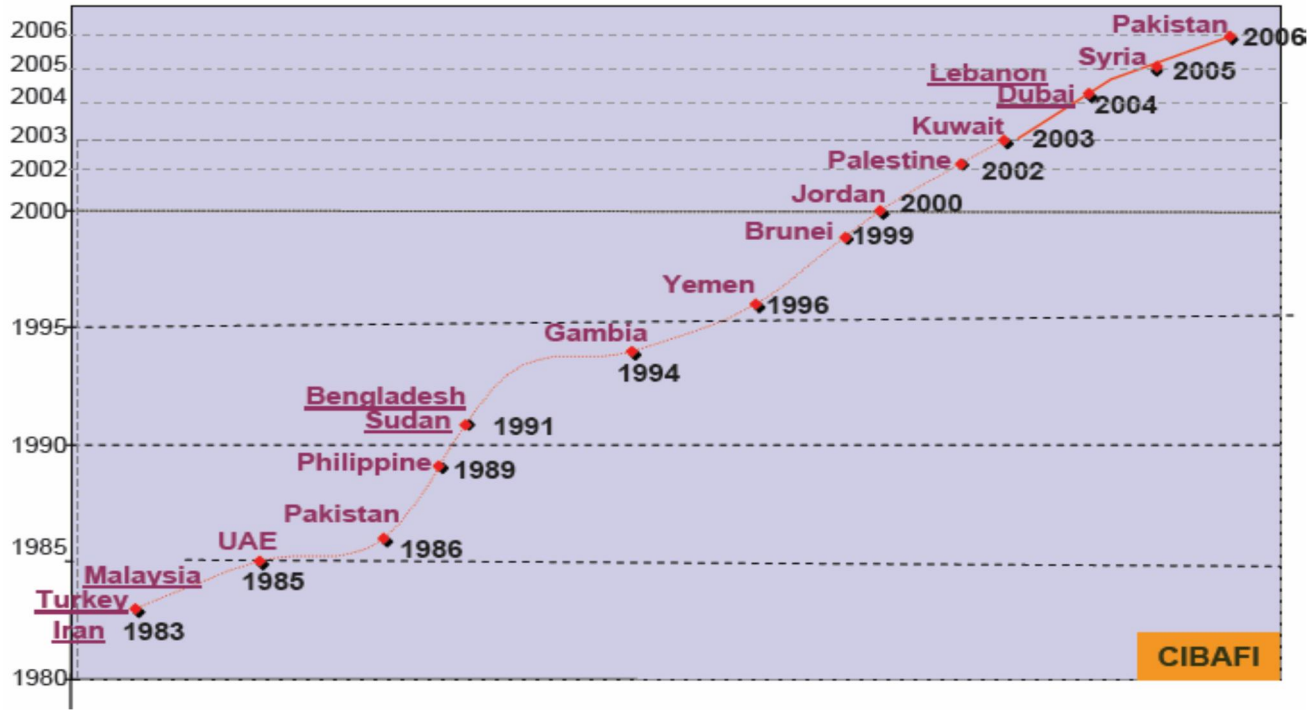

Fig. 1. Maturity of the Islamic Banks (1983-2006): Leader experiences Countries

Sources: Islamic Trajectory Experiences Rep.2007, pp23

After that, the authorities in most Muslim countries [9] are dealing with great caution with requests to establish Islamic banks due to the novelty of the experience and the lack of clarity the details of this model [10] new bank is not uncommon, nor with the exception of only three countries initiative pass laws Organization of Islamic banking which Malaysia) Banking Law Islamic 1982 AD (and Iran) law Islamic banking in 1983 (and Turkey) Act finance houses year 1983 (and after they had

approvals to establish Islamic banks in most countries stand to licenses and special laws grant the Islamic financial institutions [11] some exemptions and exceptions appropriate to the nature activity with subject to the laws traditional banking, began in his nineties show a new set of laws governing the work of Islamic banking in both Arab Emirates United (1985), Pakistan (1986), Philippine (1989), Bangladesh St. and Sudan in (1991), then Gambia (1994), Yemen (1996), …, Dubai (2005), Syria (2005) and Pakistan (2006).

3 ISLAMIC BANKING AND FINANCIAL SYSTEM: ISLAMIC BANKS AND RESOURCES MOST IMPORTANT USES

The look on the Islamic banking industry, including available by the properties [12] of self, and including experience gained in the context of adapting its products through nearly half a century of growth and development within the confines of the tolerant Islamic 'Sharia', and together with the accompanying legitimate bodies supervisory problem of the finest scientists and specialists, look that is the last lifeline and the content hosts for these opportunities. Reveal themselves in this industry has been termed the Islamic financial engineering, which represent the range of activities which include the design, development and implementation for both tools [13] and innovative financial operations. And is the banking and financial system [14] of the Islamic more stable compared with other systems; for the following considerations:

- Post depositors and shareholders at risk leads to avoid collapse in times of crisis

- Non-trading debt in the debt market integrated prevents imbalance and infection

- Link commodity cash flows lead to balanced increases in the demand and supply

- Prevention of 'riba' and 'gharar' contracts and selling seller of assets leads to minimize risks in the markets. The International Monetary Fund has approved in earlier ability Islamic financial system to absorb shocks International; because a system based on investment in commodity production, and not based on risks in the financial markets is related to the real economy, and this is what distinguishes between two different concepts: symbolic economy based on financial risks, and the productive economy based on various posts in the Department of priorities. That the primary cause of H. Simons "This is consistent with the views of a number of economists has reached" Simmons of the global recession in the thirties of the last century due to changes in business confidence arising from the credit system is stable, and can avoid the danger of economic turmoil if they are not resorting to borrowing was financing investments to proceed. On the fact that each organization self-funding, or to proceed to the capital H. Minsky "also stressed" Minsky and rational planning to invest undistributed profits, produces a strong financial system. But the producers resorting to external financing through borrowing expose the system to instability.

From the International Monetary Fund regarding Islamic banks (77 banks) and conventional banks (397 banks) in 20 countries during 2004) that Islamic banks [15] small (what was its total assets billion dollars less) is - a period of 12 years (1993 the most stable in the sample and Islamic banks large (What was the total assets of more than one billion dollars) are the least stable in the sample; terms:

- Small Islamic banks more stable than traditional small banks

- Large conventional banks are more stable than large Islamic banks

- Small Islamic banks [16] more stable than large Islamic banks

The current financial crisis has shown otherwise the results of the comparative study, it was found that large Islamic banks Is also more stable and less affected than large conventional banks. If the Islamic banks have in the past proved to be more stable than conventional banks; this stability in the light of economic fluctuations requires two things:

- Good governance: The importance of Islamic banks [17] in a state rapid expansion, in terms of increasing the number and increasing size.

- Commitment controls legitimacy [18]: by moving away from non-permissible products, such as: sample sales and Alto parchment Organizer.

4 EFFICIENCY ASSOCIATED WITH THE INTEGRATION OF FORMS AND FORMATS OF ISLAMIC FINANCE

Islamic engineering is part of the global banking industry is well known that the concept of financial [19] engineering is generally associated with the development of banking and financial system, due to the increasing needs of investors and seekers of funding and the spread of new technologies in the areas of professional knowledge and contacts, in addition to

that, boom unlimited products this system across the globe, especially with the spread of the concept of efficiency and effectiveness, as a key test when issuing financial instruments[20] and securities.

Efficiency funding solidarity 'Zakat': we can take advantage of the monetary and fiscal tools [21] zakat in achieving the required quality stability in light of the turbulent economic conditions such as: cases of inflation, recession and downturns, as follows:

- Inflation cases: using monetary tools 'zakat' to mitigate the phenomenon of inflation by affecting the ways to combine and collection, as well as direct spending methods:

- Combined cash proceeds of 'Zakat': to reduce the size of the money supply in circulation in order to achieve real interest ranked for reducing inflation and minimize its negative by the impact that can be caused by Zakat in this field, and so the state can collect Zakat in cash for all funds 'zakat'. The state has resorted to cash ratio of 'Zakat according to the nature of the prevailing inflationary situation 'Fterfha', or reduce them.

- Combining preprocess of 'Zakat': to influence reducing to block cash traded to reduce the negative effects of inflation [22], and this combination prior to the outcome of 'Zakat' to the prevailing circumstances, it may resort state to collect 50% collectively advance or less or more, and is all done by consent regulator between collection and collection and funds to prevent owners of coercion; whether these financiers have quorum zakaah is due.

- Qualitative change of Zakat distribution ratios: The distribution of the proceeds of Zakat between consumer goods and capital goods and productivity for the benefit of capital goods will increase the overall width of the through zakat productive spending and investment; and the ways contribute to reducing the inflationary pressures.

5 APPLIED ESTIMATE EFFICIENCY EXPECTED TO FORMULAS AND METHODS OF ISLAMIC FINANCE

The development boom of Islamic banking and substantial deployment of her during the last two decades has highlighted the need for funding formulas [23] and innovative Islamic contracts were not unusual at the early Muslims such as rent, ending with ownership and the parallel peace, Diminishing 'Musharaka' and Takaful insurance organization. These tools and other tools used to represent a pressure [24] distinct true that fall description, financial engineering, but it is not correct the description of derivative contracts because the contracts are not stand-alone contracts. Among the most important types of financial instruments negotiable in the money market in general:

- Ljarah:

'Ljara' is a contract whereby the less or owner to the designated 'Baijarha' eye for party (parties) last for a specific rental expenses to be agreed upon in the lease contract. And therefore [25] replace the relationship is not creditors and debts between landlord and tenant, but are related to the purchase and sale of the benefits of the original store lease.

Based on this, the 'Ijarah' is a security equal value issued represented the value of the leased property [26] allows the holder access to rental income to the contributions which pushed the instrument holder relative to other counterparts.

- Fixed lease bonds:

They represent ongoing lease where the Islamic Bank to issue these bonds and then buy money underwriting architecture, for example, and the rent for those who wish to do so shall be the price of rent is the return who 'Aozóóa' at the end of each period to holders of these bonds as the owners of this property.

- Bonds dwindling rent:

Like as before but the allocation of funds for the purchase of equipment liable for rent lease manner. The guided Finance House Tunisian Saudi time ago to issue certificates of this kind thanks to advice and recommendations supervision legitimate and he had bought from 'CóRKH' Tunisian leasing and operation is as follows, acquire CóRKH Tunisian equipment rental and leased to its customers at rental particular and the movement of ownership of the equipment to the customer at the end of the decade and pay all rent payments, and for the duration of the lease issued Tunisian Company for rental certificates for certain buyers value representing a share of the purchase price of the equipment, and buyers receive share certificates of rent income.

- Speculative instruments:

'Muqarada' or speculative [27] means an agreement between two parties which offers one of the parties of capital, and called the Lord of the money while the other 'Ikdmk' work to be split profits from this project and according to 'Atradi 'ratios

upon by the parties starting in both houses of the contract. It differs from usury, in the fact, that the return is a predetermined percentage of capital, but a percentage of profits and therefore is variable and may not be realized.

The bonds can be issued speculation [28] on the two types.

- Speculative bonds absolute long-term:

And be a ten-year or twenty years, for example, are not dedicated to a specific project, but 'EjoŏŏI' speculator is invested in any project, and shows every year profits made or loss - that occurred - in the case of verification profits annually to the holders of these bonds.

- Speculative bonds restricted long-term:

Be the same obligation previous but are agreed on the quality of project invested (commercial, industrial, agricultural ...), and can limited a certain length of time depending on the age of the project, which may sometimes be average or short-term. Perhaps one of the most successful first experiments in the issuance of such bonds speculative instruments issued by the Islamic Investment Company of the Gulf of Sharjah (UAE). Other successful experiences Investment Certificates of the Islamic Development Bank [29] in Jeddah represents the participation certificates in the portfolio of Islamic banks for Investment and Development, which was established in 1987 with Bank Islamic 'Manalbnuk' Group.

- Investment Funds:

Collection of funds through the IPO: the instruments for the purpose of investing in the field of investment accurately ID in the prospectus. Represent open-ended funds after legitimately adapted on the basis of restrictive formula speculation, mother formula for all other types of instruments [30] that are traded in the Islamic money market.

- Musharaka:

Rely main on contract participation may legitimately, a very similar instruments 'Muqarada' or speculative described above [31], but the main difference is that the instruments speculation that all the money from the party, while in 'Musharaka', we find that the argument (which are issued instruments for investors) is a partner of the group investors bondholders in a bowl partnership and in a similar manner to what is the case in a public shareholding company. Issuing bonds can participate on several pictures as follows:

- Voting shares Voting Shares: combine property rights and the right of management, voting and election.
- Non-voting stock Non-Voting Shares: represent only the rights of participation in the profits of the enterprise without the owners the right to interfere in the management or voting or election.

Pakistan used this type of bond, after the banking system full year 1981 the banks to issue certificates of participation for a bearer certificates according to the contract system participate for a maximum of 10 years and represents cooperation between the financial institution and businessmen.

- Altskik of assets (securitization 'Atwarik'):

The intended 'Altskik' here the process of converting part or group of assets - is liquid [32] and income generating predictable - owned by the company to list securities on the partnership in the benefits of these assets during a certain period. And through securitization financial institutions can access the money market image for use in the provision of liquidity to the management of risks that will enable them to achieve their targets precisely. There are also other types of instruments like 'Istisna' instruments, and instruments of peace, and can be considered as derivatives of existing funding formulas participating 'Murahaha' and speculation and other broad areas of Islamic financial engineering [33] arts suit developments constantly changing investment environment.

Represents the securitization of various assets enjoyed by Islamic financial institutions one of the important financial instruments [33] and short-term that can be used at the level of liabilities and assets management optimally. Accordingly, 'Atwarik' or 'Altskik' here differs from the aforementioned securitization customary in traditional banking.

- Murabaha:

'Murabaha' Islamic formula means the sale of a commodity information [34] at covers costs plus a profit margin agreed between Seller (bank, for example) and the buyer. The possibility of issuing instruments 'Murabaha' only possible in the case of the primary market and in particular in the case of large value of the asset or project replaces 'Murabaha' (aircraft, for example, or a development large project). While traded in the secondary market is against the law because 'Murabaha' sale may be postponed, and therefore it is our

- Bonds of peace:

These bonds cannot be traded because it may not be sold is recognized it before taking possession of the majority of scholars. This financial instrument as a substitute for Treasury that do not normally exceed 90 days, and issued by the state to control the volume of liquidity or to cover a temporary shortfall in the state budget, and pointed to the possibility of the use of peace in any production nationalist in the Muslim world, such as wheat or oil or rubber etc. metals.

Bahrain was the forerunner always, issued by the Bahrain Monetary Agency (central bank) recently private Islamic peace for three months worth of U.S. $ 25 million and annual revenue of $ 1.95%, and called instruments of peace and has offered to commercial banks and financial institutions in general.

- Expected economic efficiency of Islamic modes of financing: Islamic finance contributes [35] to avoid the negative effects and dangerous to the traditional system; where the service has been provided funding on a fair basis, through the mediation of productive investment on the basis of risk-sharing and the spoils. The Islamic finance market estimated at about $ 700 billion currently, and is expected to reach over ten years to come to 1.300 billion dollars. And economic efficiency can be highlighted the expected modes of Islamic finance at the following levels.

- Efficiency expected at the level of funds invested: The application of Islamic modes of financing to cancel economic costs, whether the costs at the micro level or at the level of the national economy, or even at the international level. In the sense that in light of economic on one applies Islamic modes of financing, with the assumption in levels of development and size of the resource; costs of final goods and services are in a state economy less participation in an interest-based economy by the burden of the cost of interest.

- Efficiency expected level of capital investment and idle capacities: The application of funding formulas for sharing system leads to ease of mixing and authoring work item and the capital element in multiple forms [36] of speculation and post 'Murabaha' and peace, 'Msacah' and farmer. Which leads to open fields to run energies is employed in various economic activities, which works for the direct treatment of the problem of unemployment.

- As relieved the negative impact from the embarrassment and hardship resulting from the imposition of interest-based system that led to the existence of funds idle embarrassed to deal with the banking institutions because of dealing benefit; then difficult to mobilize substantial funds do not move within the banking channels, and using alternative formulations of the system usurious can be removed so critical and provide the appropriate environment for the mobilization of these fiscal and monetary wealth is vulnerable and directed towards employment and important community activities; storehouse where the money goes to invest in those activities that become channels to attract significant investment and incentives.

- Based on the above; clear that Islamic modes of financing are a good alternative; with multiple positive effects; expected; to contribute to the containment of cyclical economic fluctuations.

- The business rules currently prevailing in modern financial markets and stock markets in general where several irregularities legitimacy that makes dealing in these markets taboo such as: usury and deceit, gambling and artificial inflation of prices and monopoly and so on, so must the Islamic financial market if established, or even if any are disorganized that in charge of it from falling into such prohibitions, and then only to abide by the principles of Islamic financial transactions, and to respect the conditions that govern every variation of funding in Islam, in addition to some of these rules may we mentioned when studying some types of bonds proposed for circulation.

6 STRATEGIES DEVELOPMENT OF ISLAMIC FINANCIAL PRODUCTS TO ACHIEVE ECONOMIC STABILITY

Years ago, the Islamic Institute for Research and Training Institute of the Islamic Development Bank commissioned a scientific team specializes managed to extract, 1.357 financial product of 14 reference doctrinal 'Asly'not from the four schools Indeed, financial engineering from bankers backgrounds traditional workers Islamic banks; seek to devise financial instruments depends on the expansion 'tawarruq' banking and 'Murabaha' to buy something; must not participate and speculation and the peace and 'Istisna' and other of formulas actors in the economy; for the following considerations:

- Easy traditional financial engineering;

- Need financial engineering to the depth in the Islamic 'Sharia' Sciences;

- Focus on formulas 'Madainat' in search of short-term profit.

If the world is expected redemption of Islamic economics and banking institutions from the financial crisis, the matter requires being with strategies Islamic banks set clear financial innovation process and avoid the contradiction between the objectives theory and practice! Can confirm that if the situation remained as it is restructuring operations legitimacy [37] of

traditional products; the level of Islamic financial products will descend up to the point where it converges with the level of traditional services. The Islamic financial industry will be possible before the three scenes in the foreseeable future:

Is the strategy that should be embraced by the Islamic finance industry to achieve sustainability; what she turn in the immediate future to exploit the strategic reserves of formulas doctrinal legitimacy of the products authentic Islamic operations development and innovation; so as to preserve the identity of the industry and meet the needs of the market and contribute to the local economic development.

Is that Islamic financial products are similar striking similarities with some of the traditional financial products, which is inevitably will support traditional financial products and raise the level and sustainability of the industry, just as it works to weaken privacy and the advantages of the Islamic finance industry and its products.

Is the demise of Islamic financial products as a result of lack of development of authentic products support the sustainability of the industry, and as a result of traditional financial products benefit from structuring the legitimacy of their products; All products will become a product of traditional industry.

7 CONCLUSION

In the light of globalization, Islamic banks suffer from weak competitiveness, these institutions do not have the full freedom to continue to develop new products cost the global market and entering into highly profitable global markets. Where do states and governments to great lengths to explain and identify the causes and factors for economic fluctuations periodic order mitigation; where adopt stabilization policies that aim to reduce the symbolic economy speculative that is not linked to the real economy, and scalable debts that lead to imbalance economic.

However achieved Islamic banks remarkable success [38] in providing banking services legitimacy and the size and type of competitive limited, and an increasing number of Islamic banks as intrigued economists world, There are currently more than 100 Islamic financial institutions operating in 62 countries in the world and reaches its origins to 7500 billion , and investments are distributed as follows: Middle East 56%, Gulf countries 32%, South Asia 14%, Europe and America 7%, Africa 3%, Southeast Asia 2% (Vinachel T., 16 March 1999).

And Islamic banks succeeded because it achieved revenues suitable persuaded clients on numerous occasions and got this success despite the fact that these banks have been active in the environment is appropriate in terms of the laws, rules and regulations established to strengthen regular banks that deal on the basis of interest rates and of course the legitimacy of transactions earned banks Islamic additional advantage helped customers attracted Muslims.

Islamic banks are facing some significant challenges posed by globalization and data others imposed by the laws and regulations that are active these banks, but interact with reality and moving toward the future., Islamic banks need continues to increase the rate of growth and provide new products fit the change in demand and preference , and the development of marketing and sales skills and work to reduce costs and increase the effectiveness of the 'Islamization' of all transactions this means, that Islamic banks need to theses new deal flexibly with the reality of a vision on the image of the future.

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Self Organizing Wireless Mesh Network

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ABSTRACT: A communication network with radio nodes which is organized in a mesh topology is called as wireless mesh network or WMN. They are used for variety application such as building automation, transportation, citywide wireless Internet services etc. The WMN experience link failure due to application bandwidth demands, channel interference etc. These failures will cause performance degradation. Reconfiguration is needed to preserve the network from dynamic link failure. The most of the existing algorithms are not able to give full improvement at the time of dynamic link failure. The resource allocation require global configuration changes, greedy channel assignment algorithm might not be able to realize full improvement. The proposed work is for reconfigure the network at the time of dynamic link failure. Autonomous reconfiguration system (ARS) is used to reconfigure the network. The system generates necessary changes in channel assignment in order to recover from link failure. The performance is evaluated using different types of quality parameters such as throughput, PDR, delay. Comparing with existing schemes this will provide fast recovery.

KEYWORDS: IEEE 802.11, Self organizing, Wireless, Mesh network, Wireless link failure.

1 INTRODUCTION

Wireless mesh network or WMN is a network having mesh clients and routers connected in mesh topology. It consists of mesh routers, mesh clients and gateways. Laptops and wireless devices are mesh clients. Each node serves as a host as well a router, because it forwards the packet to the other node if they are in not in the range. Here the mesh routers forward the traffic to and from the gateway. The integration with other network such as internet etc is done through gateway. There is no need of physical connection between every access point and internet. A wireless mesh network is reliable and it offers redundancy. When a node or route fails other node can communicate with each other. WMN have greater range due to packet relying. Shorter hops will provide higher throughput. These are the advantages of WMN over conventional networks.

The application of wireless mesh network include public safety, citywide intranet services, intelligent transportation system, building automation, broad band home networking etc. Application of WMN provides more flexibility compared to peer to peer network.

WMN experience link failure due to interference, mobility, application bandwidth demand etc. This will lead to degradation of network performance. It can be avoided by using reconfiguring the network. Here an autonomous reconfiguration system is used to reconfigure the network. Each node in the mesh network will monitor its outgoing and incoming link periodically. Then this link quality information will send to the gateway. If any link failure detects the reconfiguration process will occur.

1.1 REVIEW OF LITERATURE

Wireless mesh network or WMN is a network having mesh clients and routers connected in mesh topology. Mesh routers, mesh clients and gateways are the components of WMN. A WMN is reliable and it offers redundancy. WMNs are widely used

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for different applications such as broadband home networking, building automation, transportation system, public safety and environment monitoring [1]. Different forms such as multiradio /multichannel systems are used to meet the increasing capacity demands [2]-[3]. The network capacity will be decrease when the number of channel is larger than number of interfaces per nodes [2]. Work load aware routing algorithm is used for opportunistic routing. It will find out high workload nodes and assign channels [12]. Topology and interference aware channel assignment architecture (TIC) is a multi radio IEEE802.11 mesh network architecture which select channels which having high throughput paths [13].

Many solutions are used to recover from link failure in a WMN. They are having many limitations. The autonomous network reconfiguration system requires computational overhead and reasonable bandwidth [1]. The bandwidth issue is mainly due to interference due to neighboring path [14]. The resource-allocation algorithm [8]-[9] is used for initial network planning. Global configuration changes are required for this resource allocation algorithm. These global changes are not desired for frequent link failures. The faulty link settings alone are changed in greedy channel-assignment algorithm [10]. The greedy algorithm is used for partially overlapping channel assignment which will improve the network throughput [15]. These greedy changes will not be able to achieve full improvement. Network level path diversities are used in fault-tolerant routing protocols for avoiding the faulty links. The fault-tolerant routing protocols such as local routing [24] or multipath routing [25] require more network resources.

2 NEED OF THIS STUDY

WMN is deployed widely for different applications. Capacity demand will increase according to the application. The WMN will experience link failure. These failures occur due to channel interference, mobility or dynamic obstacle. This failure will degrade the network performance. The existing technology will have many drawbacks. Localized reconfiguration require network planning algorithm. Channel assignment algorithm [8]-[9] gives only the initial network planning. The degree of configuration changes is not considered here. Hence this algorithm requires global configuration changes. Greedy channel assignment algorithm [10] will consider only local area for channel assignment. This will reduce the network changes, but it will suffer from the ripple effects. Any local change will cause the change of additional network setting at neighboring nodes. This can be avoided by changing in to tree topology. This will leads to reduction in path diversity and network connectivity. Interference-aware channel assignment algorithm minimizes interference and it will use additional channels to improve overall network capacity.

3 METHOD

There are 4 steps in the case of reconfiguration. They are network monitoring, group formation, feasible plan generation and reconfiguration.

3.1 NETWORK MONITORING

Each node in the mesh network monitors its incoming and outgoing link periodically. At each time interval t_m nodes will send the link quality measurement to the gateway. Here the node will measure the link quality (l_q) and it is compared with the threshold value which is set earlier. If the link quality is above the threshold ($l_q > l_{th}$) then the link is good. If the link quality is below the threshold ($l_q < l_{th}$) then the link is failed. Once the link failure detected then the group formation process starts.

3.2 GROUP FORMATION

The group formation starts after the link failure detection process. Here the nodes which are using the faulty links will forms a group. The group formation period is t_f. The group formation is done in channel c of link l, which is a faulty link. After the group formation next step is leader node selection. Each member in the leader node will compare its energy with all other nodes in the group. After this higher energy node is chosen as leader node. This leader node will send the planning request message to the gateway. Once the planning request is send the next process starts.

3.3 FEASIBLE PLAN GENERATION

When the gateway receives a planning request it will compare this request with other requests. After that it will generate reconfiguration plan according to the planning request. If the network contains so many other failures, then there will be so many requests to the gateway. At this time the gateway synchronizes the entire request. After the synchronization gateway generate reconfiguration plan. After the reconfiguration plan generation the reconfiguration process will occur.

3.4 RECONFIGURATION

After the reconfiguration plan generation the reconfiguration process will starts. The gateway will send the reconfiguration plan to the leader node. This leader node will send this plan to all other nodes in the group. The group members change their link settings according to the reconfiguration plan. This plan will moves to the neighboring nodes.

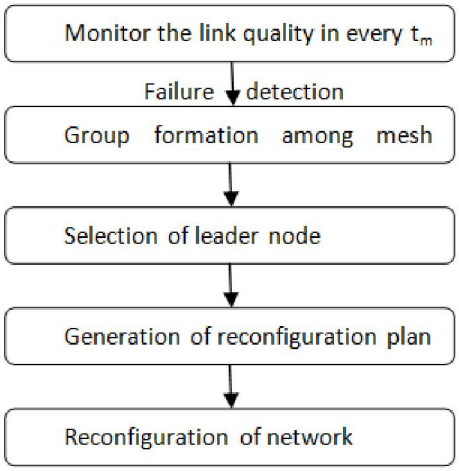

Fig. 1. Flow Chart

3.5 ALGORITHM

(1) Monitoring period (t_m)

1: **for every** link j **do**

2: measure link-quality (l_q)

3: send monitoring results to a gateway

(2) Failure detection and group formation period (t_f)

4: **if** link (l_q) violates link requirements (l_{th}), that is (l_q<l_{th}) **then**

5: request a group formation on channel C of link l

6: participate in a leader election if a request is received;

(3) Planning period (t_p)

7: **if** node is elected as a leader **then**

8: send a planning request message to a gateway;

9: **else if** node is a gateway **then**

10: synchronize requests from reconfiguration groups

11: generate a reconfiguration plan

12: send a reconfiguration plan to a leader of faulty group

(4) Reconfiguration period (t_r)

13: **if** includes changes of node **then**

14: apply the changes to links

15: relay to neighboring members, if any

3.6 NETWORK MODEL

The topology is shown in Fig 1. Here 25 nodes are arranged in grid topology. The red node is gateway and all other are mesh routers. If any link fails the node which uses the faulty link will forms a group and a node is selected as leader node. This leader node will send the planning request to gateway. This gateway will generate the reconfiguration plan according to the planning request. The gateway will send the reconfiguration plan to the mesh routers. The mesh routers will execute the reconfiguration plan.

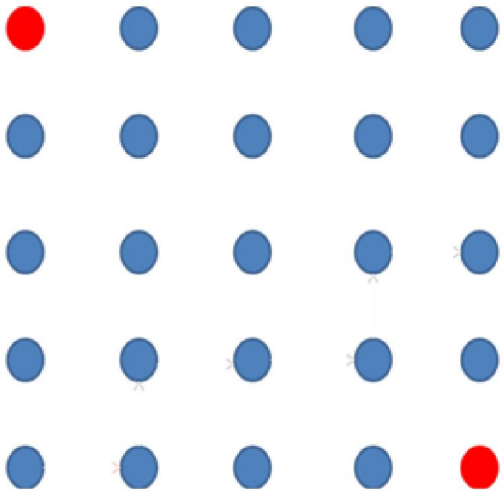

Fig. 2. Network Model

4 RESULTS AND DISCUSSIONS

The performance is evaluated using ns2 simulator. IEEE 802.11 is used here. 25 nodes with grid topology are created. The evaluation parameter is shown in table 1.

Table 1. Evaluation Parameters

Parameter	Value
Area	200 x 200 (m^2)
Channel	Channel/WirelessChannel
Propagation model	Propogation/TwoRayGround
Network Interface	Phy/WirelessPhy
Interface Que Type	Queue/DropTail/PriQueue
Interface Queue length	50 packets
Total number of mesh nodes	25
Routing protocol	AODV
Transport layer protocol	TCP
MAC Interface	Mac/802.11a
Antenna Type	Antenna/OmniAntenna
Application	FTP

The performance of the network is evaluated in terms of Throughput, Packet Delivery Ratio (PDR), and Delay parameters, defined as follows,

- Throughput is the average rate of successfully transmitted data packets over the communication channel's capacities
- Packet Delivery Ratio (PDR) is defined as the ratio of the total number of successfully transmitted data packets to the total number of data packets sent from the source to the destination.
- End-to-end delay refers to the time taken for a packet to be transmitted across a network from source to destination.

The mesh network is created with 25 nodes with grid topology. The performance is analysed for different conditions are analysed. The throughput comparison is done for a network with and without reconfiguration. The performance is analysed for mobile nodes and stable nodes.

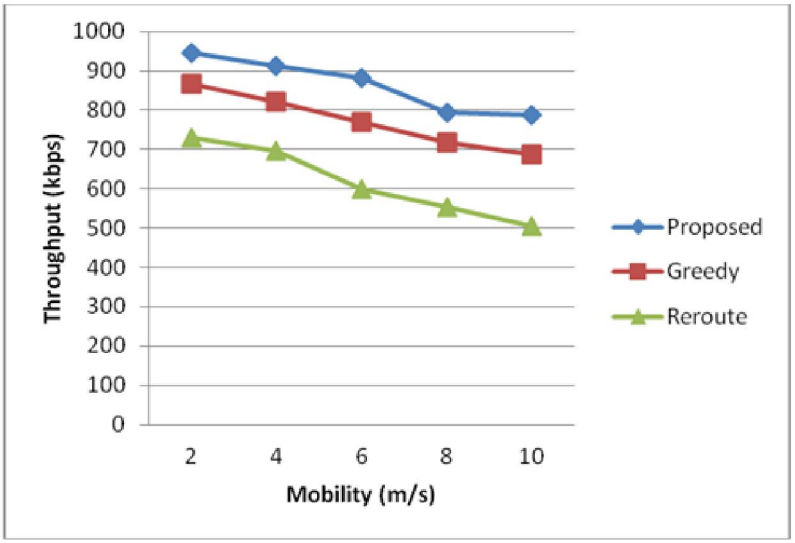

Fig. 3. Throughput Vs Mobility

Throughput Vs mobility graph is shown in Fig 3. The throughput is decreases with increase in mobility. Here the proposed work have higher throughput than the greedy algorithm. The network with ARS provides 15% improvement than the existing greedy algorithm.

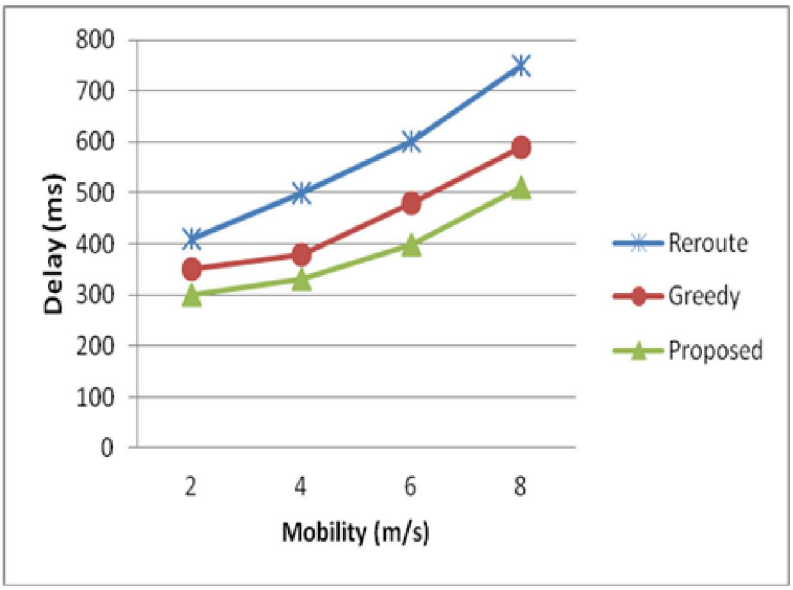

Fig. 4. Delay Vs Mobility

The delay Vs mobility graph is shown in Fig 4. The delay will be increasing as the mobility increase. Here the delay for different algorithms is compared. The delay for the proposed model is less than the existing technique.

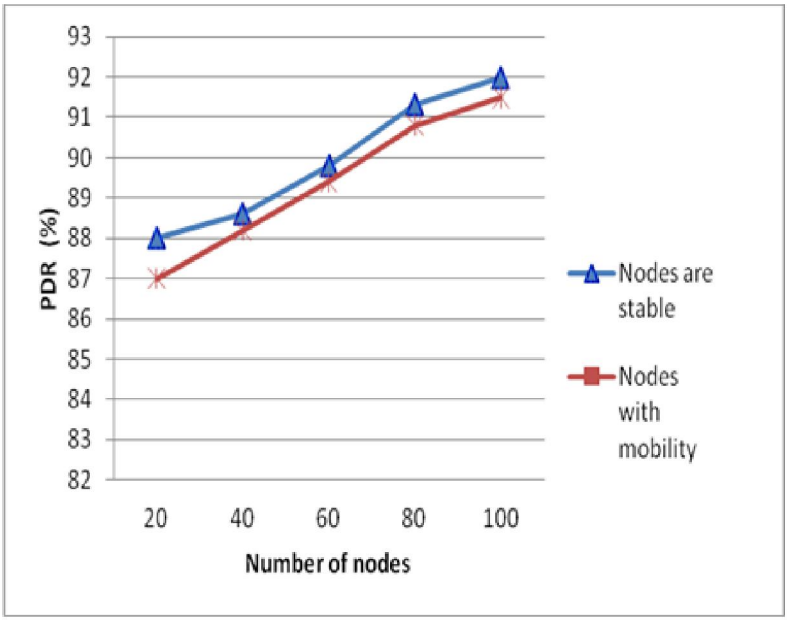

Fig. 5. PDR Vs Number of nodes

The PDR Vs number of nodes is shown in Fig 5.4.4. When the number of nodes increases the PDR will increase. The packet delivery ratio will be less for network with mobile nodes than the network with stable nodes.

5 CONCLUSION

A wireless mesh network is a communication network having mesh routers and mesh clients connected in a mesh topology. Dynamic link failure due to interferences will lead to network performance degradation. The link failure is avoided using autonomous reconfiguration system. This will provide a fast recovery from link failure using reconfiguring the network. This ARS technique will improve the network performance compared with existing technology. This will give a fast recovery from the dynamic link failure.

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Classification of olives from Moroccan regions by using direct FT-IR analysis: Application of support vector machines (SVM)

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ABSTRACT: The aim of this work was to characterize and classify three close regions of olives by direct analysis on the olive without any preliminary treatment. This study was focused on the olive samples picked in the three zones: named Bazaza, oled ayad and oled hamdan, in the Moroccan region of Beni Mellal. All samples were also analysed by FT-IR spectroscopy, the spectral data were subjected to a preliminary derivative transform based on the gap segment algorithm to reduce the noise and extract a largest number of analytical information from spectra. A multivariate statistical procedure based on cluster analysis (CA) coupled to support vector machines (SVM), was elaborated, providing an effective classification method. On the basis of a hierarchical agglomerative CA and principal component analysis (PCA), three distinctive clusters were recognized. The SVM procedure was then applied to classify samples from the same regions. The model resulted able to separate the three classes and classify new objects into the appropriate defined classes with a percentage prediction of 93%. The results showed that FTIR spectroscopy coupled with chemiometric methods are an interesting technique for classifying olive samples according to their geographical origins.

KEYWORDS: Olives, FT-IR spectroscopy, Chemometrics, geographical origin, Support Vector Machines.

1 INTRODUCTION

Nowadays, one of the major issues regarding food products is to develop objective tools to determine the origin of raw materials as well as finished products in order to ensure their traceability [1].

Traceability is particularly relevant to assessing origin and content of the olive oil but also to protect and prevent frauds at different stages in oil production. In this case, the quality of virgin olive oil is principally a function of four parameters: varietal and geographic origin, olive fruit quality and extraction process. The oil content in olive fruit was shown to have a high variability between cultivars [2].

A denomination of a cultivar is recognized using different morphological descriptors (tree, leaf, fruit, and stone). However, on the basis of these criteria, only very dedicated specialists are able to perform a strict differentiation between all

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the cultivated varieties. The origin and the authenticity of virgin olive oils have been the object of many studies in the past few years [3], [4].

The application of spectroscopy which includes IR and Raman techniques combined with chemometric methods is a relatively new approach in food characterization studies [5]. Fourier transform infrared spectroscopy (FTIR) has been successfully used to quantify a number of olive oil parameters [6]. This technique is fast, simple to perform and does not require sample pre-treatment.

Fourier transform infrared (FTIR) spectroscopy, a widely used and well-established tool for structure elucidation and quality control in various industries application, has gradually entered into the identification and classification of natural products like herbal medicines [7], microorganisms [8] and foods [9]. The obvious advantage of FT IR is not only in the effective specificity but also its rapid and nondestructive nature.

FTIR has been proposed to authenticate extra virgin olive oils or to detect adulteration of virgin olive oil [10], [11]. Some attempts in using FTIR to distinguish olive oils from different geographical origin and different genetic varieties have been proposed [6], [12], [13], [14]. This approach has demonstrated to be very useful in many applications, due to the ability in achieving the spectral resolution of the FTIR signals [15]. But, to our knowledge, little has been done to determine the origin of raw materials with morphological characterization [16], to identify olive varieties [17], [18], [19].

The aim of this study was to show the advantages of combined MIR spectroscopy associated with chemometric treatment for a direct and rapid test method used firstly to provide geographical origin recognition of olive fruits and secondly to demonstrate the capability of this new technique to distinguish from regions very close.

2 MATERIALS AND METHODS

2.1 SAMPLING

The study area is confined to province of Beni-Mellal in central Morocco, expanded on a surface of nearly 7100 Km². Investigation was focused on the olive samples (of Picholine Marocaine variety) picked in the zones named Ouled Hamdan, ouled Ayad and Bazzaza. Altitude of these regions is 600 m, temperature ranges from 3.5 °C to 48 °C and precipitation rate is 300 to 750 mm.

Sampling is an important step. Indeed, the reliability and robustness of the method adopted repose largely on the choice and number of samples. We created two different collections of samples. The first includes 24 olives were manually harvested from three farms belong to the three areas.The second consists of 24 olives were randomly collected from an extraction unit of olive oil.

48 olives chosen from the harvested olives based on their size, maturity and the absence of surface defects. Similar size olives were chosen to minimize the effect of size on spectral measurements.

A series of 14 samples (from second collection) was used as an external validation set. This last series was used to establish the robustness of the SVM model. whilst the remaining 34 sample were selected to build up the calibration model

The olive samples were kept in cold storage (7°C) during the nights between the days of measurements. Spectroscopic measurements were taken from the olives after they had been brought into equilibrium with the room temperature of 25°C.

2.2 SPECTROSCOPIC MEASUREMENTS

Spectra were recorded from 4000cm-1to 600cm-1, with 4cm−1 resolution and 98 scans on a “Vector 22 Bruker” spectrometer, equipped with a DGTS detector, an Globar source and a KBr/Germanium beam splitter. Olive samples were directly deposited between two well-polished KBr plates, without preparation on an Attenuated Total Reflectance cell provided with a diamond crystal. The background spectrum was recorded on air for of each sample.

Spectra were scanned in the absorbance mode from 4000 to 600 cm^{-1} and the data were handled with OPUS logiciel. The software (Opus 4.0 MSD) fitted to the infrared spectrometer Fourier transform used in this study allows the automatic acquisition of the spectra without any form of computer manipulation may impair the quality of results. The Fourier transform is automatically calculated by the software prior to the acquisition of spectra.

Between spectra, the ATR plate was cleaned in situ by scrubbing with ethanol solution, enabling to dry the ATR.

For ATR-FTIR measurements, it was necessary to keep a controlled pressure, to ensure good contact between the sample and the diamond surface.

2.3 CHEMOMETRIC METHODS

2.3.1 CLUSTER ANALYSIS

Cluster analysis is a non-supervised technique, represents a series of multivariate methods which provide means for classifying a given population into groups (clusters), based on similarity or closeness measures. The objective principle of the distance is adopted for this aim. The agglomerative hierarchical clustering is nowadays one of the most cited methods in literature [20], providing intuitive similarity relationships between each sample and the entire data set.

In hierarchical clustering, each cluster is subdivided into smaller clusters, forming a tree-shaped data structure or dendrogram. Agglomerative hierarchical clustering starts with the single-gene clusters and successively joins the closet clusters until all genes have been joined into the supercluster: The sample grouping is illustrated by a dendrogram that permits a global vision of the similarity among the objects. In fact, there is a whole family of clustering methods, differing only in the way intercluster distance is defined [21].

In this work, as hierarchic agglomerative cluster algorithm, the complete linkage (largest distance between any two members) algorithm was adopted to process the similarity and the distance elaboration was performed using correletion distance. This distance is based on the Pearson correlation coefficient that is calculated from the sample values and their standard deviations. The correlation coefficient r takes values from –1 (large, negative correlation) to +1 (large, positive correlation). Effectively, the Pearson distance **dp** is computed as

$$\mathbf{dp = 1- r} \qquad (1)$$

And lies between 0 (when correlation coefficient is +1, i.e. the two samples are most similar) and 2 (when correlation coefficient is -1). Note that the data are centered by subtracting the mean, and scaled by dividing by the standard deviation [22], [23].

2.3.2 PRINCIPAL COMPONENT ANALYSIS (PCA)

Principal component analysis (PCA) is a non-supervised statistical tool commonly used for classification of data. The main aim of PCA is to reduce a large number of variables to a much smaller number of principal components (PCs) that capture the vast majority of variance in the data. This reduces the dimensionality of the data considerably, enabling effective visualization, regression and classification of multivariate data [24], [25].

2.3.3 SUPPORT VECTOR MACHINES (SVM)

SVM is a supervised learning technique for classification and regression that uses linear or non-linear kernel-functions to project the data into a high-dimensional feature space. Correlation is then performed in this hyperspace based on the structural risk minimization principle; *i.e.*, aiming to increase the generalization ability of a model [26], [27].

Two SVM classification types are available in The Unscrambler logiciel which are based on different means of minimizing the error function of the classification:

- c-SVC: also known as Classification SVM Type 1.
- nu-SVC: also known as Classification SVM Type 2.

In the c-SVM classification, a capacity factor, C, can be defined. The value of C should be chosen based on knowledge of the noise in the data being modeled. Its value can be optimized through cross-validation procedures. When using nu-SVM classification, the “nu” value must be defined (default value = 0.5). Nu serves as the upper bound of the fraction of errors and is the lower bound for the fraction of support vectors. Increasing “nu” will allow more errors, while increasing the margin of class separation [22].

The choice of SVM as classification method is justified by the results obtained in References [28], [29], [30], [31], where the great performance of SVM becomes evident, and several authors have shown, that support vector machines provide a fast and effective means for classification.

2.3.4 SOFTWARE

The chemometric applications were performed by using the Unscrambler software version 10.2 from CAMO (Computer Aided Modeling, Trondheim, Norway).

3 RESULTS AND DISCUSSION

Fourier transform infrared (FTIR) spectra of 48 olive samples were recorded and divided in two sets: a calibration set of 34 samples and a prediction set of 14 samples. A mean spectrum was calculated for each region of calibration set. The resultant spectra are shown in Fig.1.

Fig.1 shows the mean FTIR spectra of the studied olives. The differences among them were clearly small and occurred only in limited regions of the spectra. The obtained spectra are dominated by typical bands of holocellulosic materials in the 900-1200 cm^{-1} region [32].The significant bands of water are clearly visible in the olive spectra at 3400 cm^{-1}. The band of aromatic ring stretch of lignin should appear at 1604 cm^{-1}. However, this region was obscured by the strong water deformation band centered at 1638 cm^{-1}. The typical infrared pattern of lignocellulosic materials is observed in the region 900-1200 cm^{-1}. The two bands at 2924 cm^{-1} and 2848 cm^{-1} are characteristic of olive oil, while the range 2400 - 2300 cm^{-1} is due to CO2.

The use of single peaks or narrow wavelength ranges to obtain information useful to distinguish the olives seemed very hard. These data were so conveniently handled by multivariate statistical techniques. With the aim to obtain more information from the FTIR spectral data, the spectra were firstly subjected to mathematical elaboration. In particular, derivative transformations were applied [33], [34].The best improvement in data variance was reached when the derivative function through the Gap segment algorithm was used. Best results were obtained by fixing the following parameters: 2nd order, gap size 7 and segment size 5, with mean-centered data.

3.1 CLUSTER ANALYSIS

The calibration data set obtained from derivative transformation of the FTIR data was employed to perform CA, applying complete linkage clustering. Results were reported in the form of dendrogram, shown in **Fig.2**. On the basis of the connecting distances three distinctive clusters were defined.CA proved highly selective in grouping the olive samples. In fact, while belonging to the same variety (Picholine Marocaine), the method was able in aggregating the samples from different regions.

It is noteworthy that, for the analytical responses, the water content in these samples could be considered significant, as demonstrated by the relevant change in the broad band between 4000 and 3000 cm^{-1}, or due to the variation of the oil content and fatty acid relative rates of samples of each class. In the other hand, since the three regions are characterized by the same climatic conditions, we can say that the distinction between the classes is the result of a change in the composition of the soil.

3.2 PCA MODELING

PCA model was built by the multivariate decomposition of the FTIR data in the ranges 4400–2400 and 2300–600 cm^{-1}. When the model was validated by full cross-validation procedure [35], PCA showed a clear separation of the three classes. The explained variance (%) obtained from the full cross-validation of the PCA model and three PCs were selected for a complete description of the variance in the spectral data set: 98%. In the PCA model, the first two components achieved an explained variance of 94%, which is enough to cluster the samples in the three classes, as can be seen in the score plot of Fig. 3.

Thus, we see on plot loadings that the first PC has 82% of the variance (Fig.3 (a)), while the second PC only 12% (Fig.3 (b)). These two loadings plot highlight the variables responsible for the distinction between the three classes, it is the spectral range characteristic of oleic acid composition and characteristic band of water.

3.3 CLASSIFICATION MODEL: SVM MODELING

The SVM model was built by considering, as X variables, the spectra in the range 4000-2400 and 2300-600cm^{-1}; and the classification model was validated by Cross validation with segment = 30.

We constructed SVM model with a nu-SVC classification, different kernels have been tested on these data, and the results showed that the best choice is the linear kernel, to determine the hyperplane that give best separates the classes. The optimal parameter for "nu" which lies in the range 0-1, is then selected as the value that give the maximum correct classification rate, nu = 0.5. Consequently, a larger number of calibration samples are retained as support vectors, it is 28, where 10 of Bazzaza samples, 9 of Oled ayad samples and 9 of Oled hamdan samples.

Application of SVM with Cross validation on a set of thirty-four samples allowed a classification with accuracy of 100% in training and 97% in validation, which can be considered satisfactory.

The main result of the SVM is the confusion matrix, which indicates how many samples were classified is each class, and the prediction matrix, which indicates the classification determined for each sample in the training set.

The confusion matrix is a matrix used for visualization for classification results from supervised method, support vector machine classification. It carries information about the predicted and actual classifications of samples, with each row showing the instances in a predicted class, and each column representing the instances in an actual class. Look at the confusion matrix (Table 1). All the samples are well classified.

This result is confirmed by classification plot (Fig.4), in fact, based on three characteristic wavelengths of water and oleic acid, detected as significant variables responsible for the distinction between the three classes in loadings plot of PCA, all the classes resulted perfectly separated from the other ones.

3.4 CLASSIFICATION OF NEW SAMPLES

In this step, the model was subdued to validation procedure by classifying the new objects in to the classes previously established.

The SVM model was applied to a group of unknown samples from different olives of three regions (14 external olive samples), the results are listed in Table 2.

Table 2 shows the classification results with the comparison between the predicted results of each class and the theoretical reference classes. The rate of correct classification was 93% within the test set. In particular13 samples were safely assigned in the three classes, while one sample O8 resulted classified in another class.

4 TABLES AND FIGURES

4.1 TABLES

Table 1. Confusion matrix of calibration set, carried out by SVM

Confusion matrix	BAZ	OAY	OHD
Predicted	**1**	**2**	**3**
BAZ	10	0	0
OAY	0	10	0
OHD	0	0	14

Table 2. Classification of olive samples of the prediction set by using SVM model

Samples	Predicted	Reference class
O1	BAZ	BAZ
O2	BAZ	BAZ
O3	BAZ	BAZ
O4	BAZ	BAZ
O5	OAY	OAY
O6	OAY	OAY
O7	OAY	OAY
O8	OH	OAY
O9	OH	OH
O10	OH	OH
O11	OH	OH
O12	OH	OH
O13	OH	OH
O14	OH	OH

4.2 FIGURES

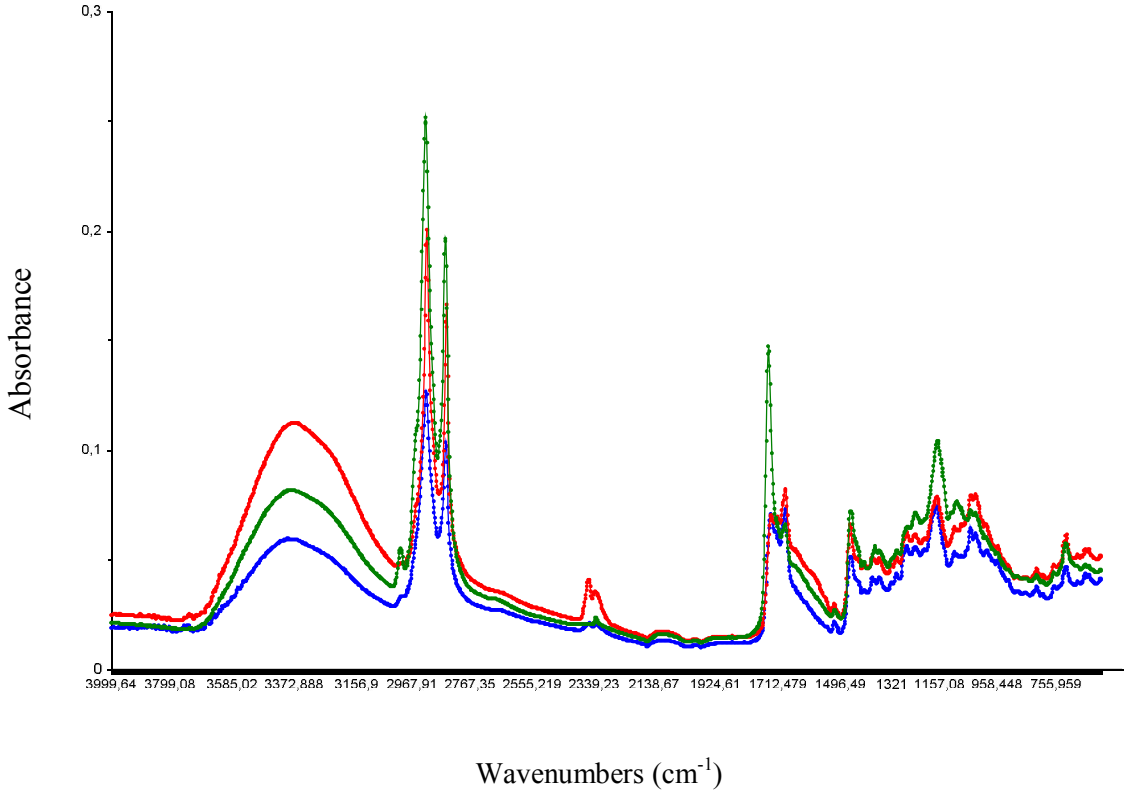


Fig. 1. The mean spectra calculated for each class: Oled hamdan (Oh), Oled ayad (Oay) and Bazaza (Baz)

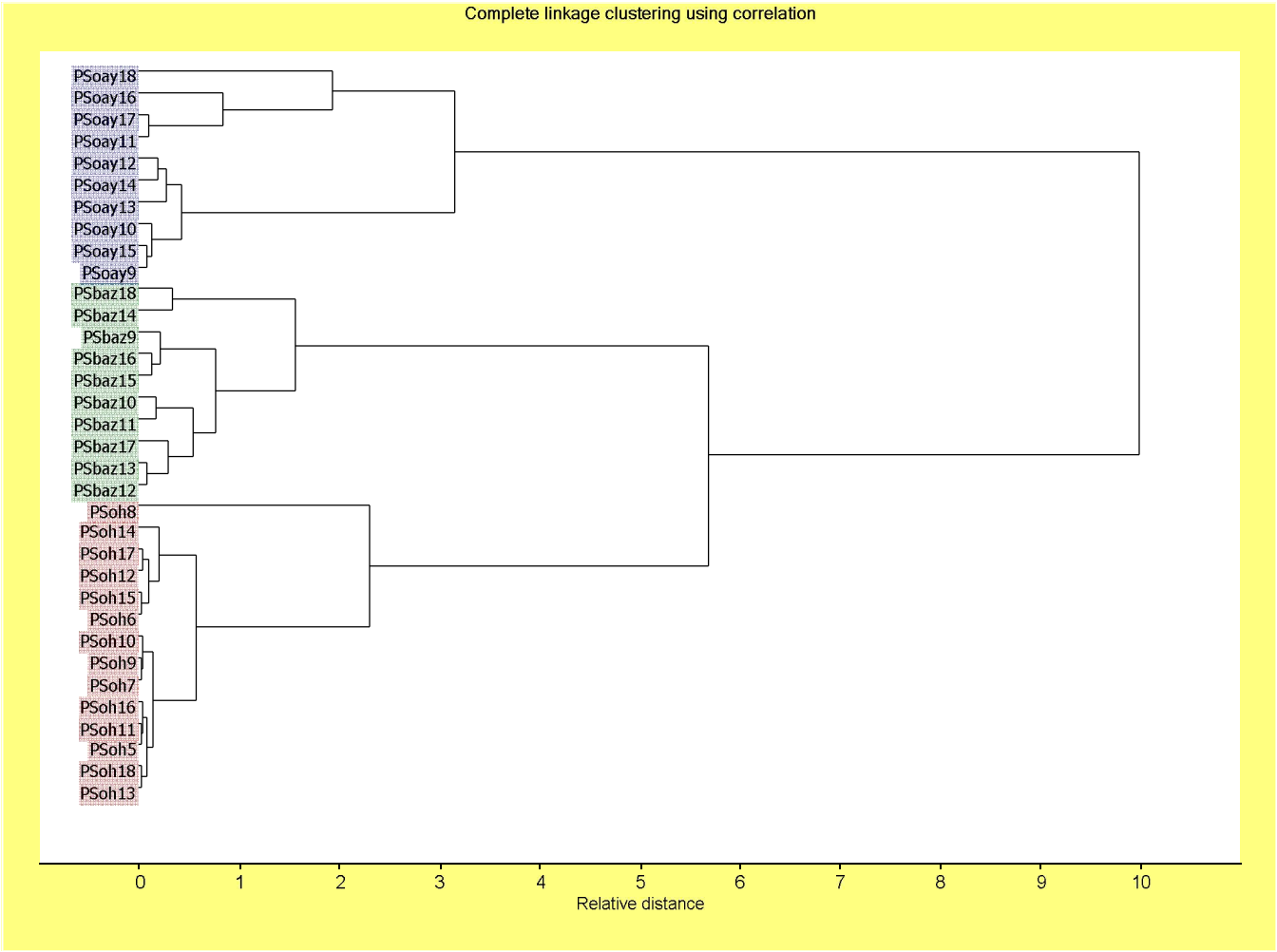


Fig. 2. Dendrogram by CA analysis on the calibration set

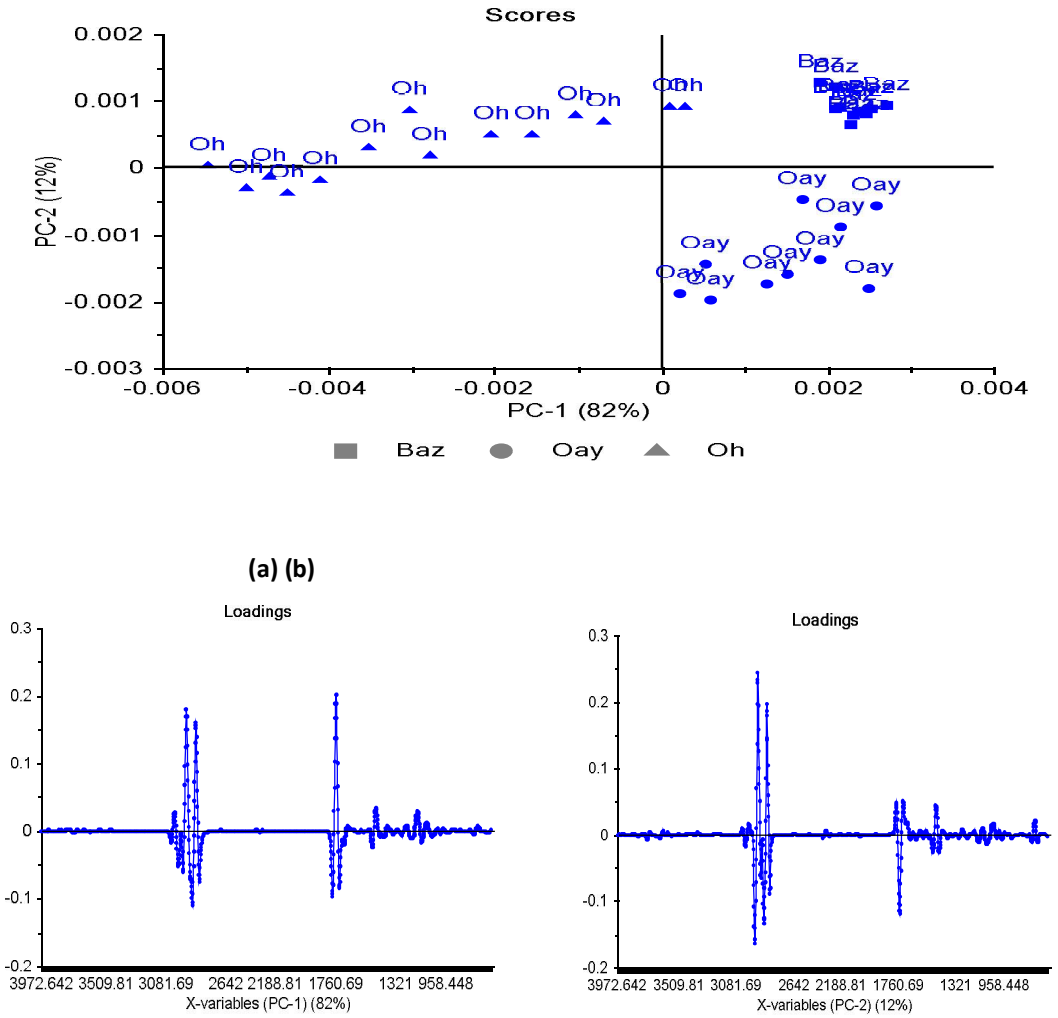
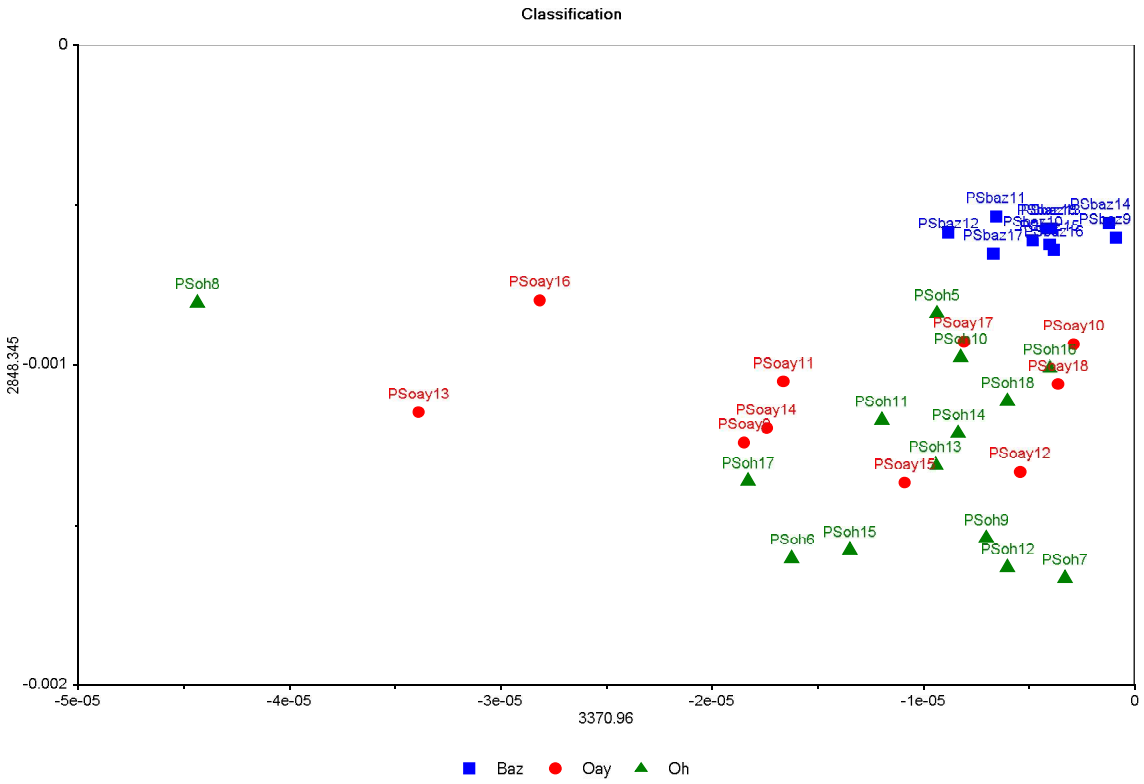


Fig. 3. PC1 / PC2 Score plot by PCA analysis on the calibration set: Oled hamdan (Oh), Oled ayad (Oay) and Bazaza (Baz); (a) first principal component; (b) second principal component

(a)



(b)

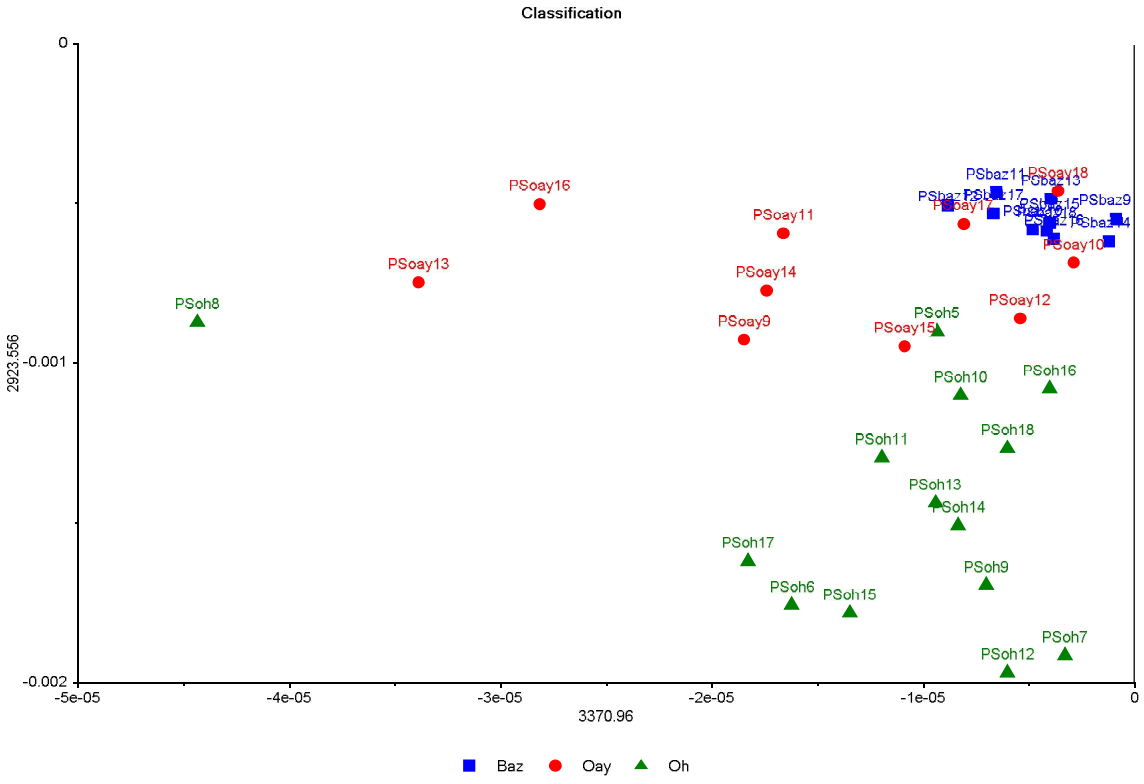


Fig. 4. 2D score plot of classification results by SVM on calibration. (a) with 2 wavelenths 3370 / 2848 cm^{-1}; (b) with 2 wavelenths 3370 / 2923 cm^{-1}

5 CONCLUSION

This study shows that olives of three regions close can be discriminated by differences in their FTIR spectra. Synchronous IR spectroscopy combined with multi-dimensional chemometric techniques is successfully applied to the classification of olives according to their geographical origin. The method presented in this study can be used in olive oil production facilities for the rapid quality control of raw material based on olives as spectra are acquired from samples 'as-received' without any pretreatment.

Then, the spectroscopic methods, combined with chemometric strategies, could represent a reliable, cheap and fast classification tool, able to draw a complete fingerprint of a food product, describing its traceability.

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Cultural Eutrophication of Lonar Lake, Maharashtra, India

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ABSTRACT: Lonar is one of the youngest Lake and is unique in the world for its alkalinity and salinity of the water. But its alkalinity, pH and salinity go on decrease day by day. An attempt has been made to examine environmental analysis of Lonar Lake. *Objective*: This papers aims at improving the water quality in the lakes from hyper-eutrophic to minor eutrophic conditions. *Methods*: The physical and chemical parameters were analyzed as per APHA. *Results*: It is found that major *Spirulina* species of algae was found in lake water. This species Spirulina having medicinal value for human body. This species occupied the Lonar lake water phytoplankton about 90.0% and above. Rests of 10 % are other members of Chlorophyceae, Cynophyceae and Bacillariophyceae also found in this lake. Lonar lake water was found to be very rich in mineral nutrient contents. No fish species was recorded in the same water body. *Conclusions*: Hence this World heritage lake should be preserved for its alkalinity and salinity. Use of agrochemicals on crater floor; nuisance of tourists; sewage disposal in the lake; constructions on the crater rim; etc. are some of the problems requiring attention. The lake urgently needs to take immediate protection from pollution and save and preserve for future generations.

KEYWORDS: Alkalinity, Salinity, Lonar Lake, Spirulina, Nutrient Enrichment, Cultural Eutrophication.

1 INTRODUCTION

Lakes are generally defined stagnant water body surrounded by land. Eutrophic lakes are shallow, murky bodies of water with concentrations of plant nutrients causing excessive production of algae. Eutrophication is the slow aging process during which a lake, estuary, or bay evolves into a bog or marsh and eventually disappears [1]. Eutrophication is the process of enrichment of nutrients in an aquatic ecosystem [2]. Cultural eutrophication (excessive plant growth resulting from nutrient enrichment by human activity) is the primary problem facing most surface waters today. It is one of the most visible examples of human changes to the biosphere [24, 25].

Cultural eutrophication is a universal phenomenon and no inland water body is spared from this serious ecological stress. This is a natural crater lake created by meteorite impact, receiving water by underground channels. Water conservation projects in the vicinity of the lake are a cause of concern, since seepage of water from reservoirs is changing the water quality of the lake and, in turn, affecting its unique limnology. A once-sleepy village is undergoing urbanization, with problems of non-point sources of sewage pollution leading to Lake Eutrophication impacts [4].

The process whereby a body of water becomes rich in dissolved nutrients through natural or man-made processes. This often results in a deficiency of dissolved oxygen, producing an environment that favors plant over animal life [5]. Eutrophication often results from nutrient enrichment sewage, fertilizer runoff; even decomposing leaves in street gutters can produce a human-caused increase in biological productivity called cultural eutrophication [6]. In the last 2 – 3 decades the environmental degradation of most of the micro or sub ecosystem of Lonar Lake alarms the environmentalists. If steps are not taken to protect the area, tomorrow will be too late [7]. In India many researchers have worked on physicochemical and biological characteristics of reservoir's and rivers [8], [9], [10], and [11].

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Lonar Lake is the third largest natural salt water lake in the world. The Lonar Lake is a deep crater-like hollow or basin in the basalt-plateau of the Deccan, in the district of Buldhana. The depression is about 300 feet in depth and about a mile in diameter. It is surrounded on all sides by a rim formed of blocks of basalts. The depression contains at the bottom a shallow lake of saline water. The chief constituent of the salt water is sodium carbonate, together with a small quantity of sodium chloride. These salts are thought to have been derived from the surrounding trap country by the chemical solution of the disintegrated product of the traps and subsequent concentration [12].

The aim of the present study deals with Physic-chemical analysis of water is to determine the nutrient status of the water with reference to eutrophication. Hence the water parameters which focus on the Lake as a saline and eutrophicated had been mentioned in this paper. All the results point out that the Lonar Lake is getting polluted day- by- day and has been at an eutrophication stage now.

1.1 STUDY AREA

The Lonar Lake, situated in the Buldhana district of Maharashtra State, India, is located at 19° 58'N, 76° 31'E.Lonar Lake, often described as the geological wonder, which ranks third in the world amongst the craters created by the meteorite impact in basaltic rock. Formed some 52,000 years ago, it is today a closed basin lake that is saline and alkaline, rich in carbonates and bicarbonates [3].

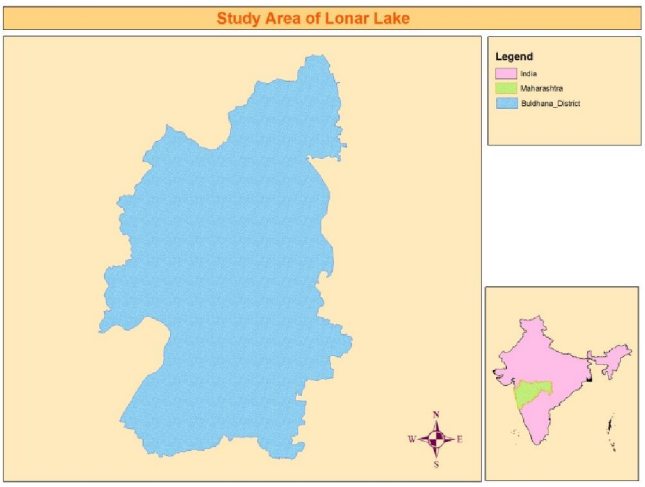

Fig. 1. Map of study area of Lonar Lake

Fig. 2. Area of Lonar Lake

2 MATERIAL AND METHODS

2.1 SAMPLING METHODS:

Four water samples were collected from four sampling site of Lonar Lake in 1liter pit bottles and carried to the laboratory. The physical and chemical parameters were analyzed as per Standard Methods for the Examination of Water and Waste Water, 17th edition, [13], [14] and [15]. Sampling was done three times in the year at morning in 2011. The pH, temperature, DO, and TDS were determined on the spot rest of the parameters were analyzed in the laboratory by standard methods.

3 RESULTS AND DISCUSSION

In this study total 4 water samples; in pre-monsoon, 4 in monsoon, and 4 in post-monsoon ware analyzed from Lonar Lake. The number of physicochemical parameters like pH, EC, temperature, colour, odor, total dissolved solids, alkalinity, dissolved oxygen, chloride, salinity, total hardness, calcium hardness, magnesium hardness, sulphate, phosphate, calcium, magnesium, fluoride, iron, manganese, sodium, potassium and nitrate were performed. In the present study the data revealed that there were considerable variations in the quality with respect to their physicochemical characteristics. Physicochemical analysis of Lonar Lake water was studied in different season (2010-2011). The average value of various water quality parameters had been mentioned in Table and represented in graphs.

It is also observed from the present study that, the colour of the lake water is also pale green to dark green which is a result of the highly dense algal population with predominating Spriulina. The odor of lake water is somewhat an offensive or objectionable. Muley and Babar noted the Offensive odor of the lake water. The pH of Lonar Lake water varies from 6.7 to 9.1and temperature 23 0C to 26 0C. The total dissolved solid is in the range of 630 to 690 and dissolved oxygen recorded in the range 1.2 to 2 mg/liter. Since the water contains dissolved and suspended constituents in varying proportions, the composition of the Lonar water is of the Na2HCO3Cl type [16]. It often has different physical and chemical properties along with biological variation. It may be the appearance of high concentration of Spriulina, which is an indicator of extremely high photosynthetic rate. If there is a moderate amount of dissolved matter, the lake will probably appear green because the phytoplankton blooms produce a green or chartreuse color [17].

Hypoxic and sub toxic conditions frequently occur in coastal waters, where low subsurface O2 levels can be generated by natural high biological productivity in the Over lying waters or by eutrophication from agricultural runoff or sewage inputs [18]. The lake has been undergoing eutrophication in recent years because of domestic sewage inputs from the fast-developing town of Lonar. Anthropogenic activities (construction, washing, bathing and alterations in the basin) are adversely impacting the lake. The long-term sustainability of this ecologically-, economically- and culturally-significant lake ecosystem rests in application of Integrated Water Resources Management (IWRM) and the 7 Principles espoused in the World Lake Vision [4]. Spirulina is well known indicator of brackish eutrophic lake water. This species dominated the Lonar lake water phytoplankton with around 92.0% composition and above. This observation is supported by the reports quoting the occurrence of this alga in large number in brackish water all over the world like many Sodic lakes in Africa, Sonachi and Simbi [19], [20]. Similarly species of Spirulina were also recorded in Lonar lakes [21]. The higher values of pH may be due to the increased in nutrients and productivity in aquatic ecosystem [22] and [23].

We also find the similar results Spirulina is well known indicator of eutrophication. This species we recorded an around 90.0%. Rest of 10 % other members of algal group are Chlorophyceae, Cynophyceae and Bacillariophyceae also found in this lake. Here we find that the cultural eutrophication of this lake is takes place. Similar results are also found to Khobragade et al. Lonar Lake is a very suitable environment for growing blue green algae like *Spirulina* by proper manipulation of the ecosystem. A review of literature revealed that it salinity were decreasing day by day. High salinity with very low dissolved oxygen level of this unique ecosystem does not support aquatic fauna like fish and zooplanktons, which are not recorded during our studies. Similar observations have been reported in the literature. There is an urgent need to undertake intensive lake basin management efforts to prevent environmental degradation of this unique lake ecosystem, which also has significant socio-religious and tourism potential [4]. Governmental agencies, unfortunately, did not recognize the potential of this lake as a basis for global scientific and tourist interest, due possibly to its remote location. There presently is no long-term perspective or planning for its conservation.

4 TABLES AND FIGURES

4.1 TABLES

Table 1. Physic-chemical parameters of Lonar Lake water samples

Sr. No.	Parameters	Post Monsoon	Pre Monsoon	Monsoon	Average
1	Odor	Objectionable	Objectionable	Objectionable	Objectionable
2	Colour	Greenish	Greenish	Greenish	Greenish
3	pH	6.74	9.1	8.55	8.13
4	Electrical conductivity	220	340	330	296.6
5	Temperature	25 ˚ C	26 ˚ C	23 ˚ C	24.6 ˚ C
6	Total Dissolved Solids(mg/L)	750	630	930	770
7	Alkalinity(mg/L)	3590	3760	3630	3660
8	Total Hardness(mg/L)	130	120	140	130
9	Calcium Hardness(mg/L)	50	20	50	40
10	Magnesium Hardness(mg/L)	80	100	90	90
11	Sulphate(mg/L)	230	154	201	195
12	Phosphate(mg/L)	0.904	0.634	1.690	1.076
13	Chloride(mg/L)	3017.5	3337	31.90	2128.8
14	Calcium(mg/L)	20.04	8.016	12.03	13.362
15	Magnesium(mg/L)	19.49	24.36	21.40	21.75
16	Dissolved Oxygen(mg/L)	2.0	1.12	1.8	1.64
17	Fluoride(mg/L)	0.2	0.21	0.2	0.203
18	Iron(mg/L)	04	12	09	8.33
19	Manganese(mg/L)	0.4	0.6	0.5	0.5
20	Salinity(mg/L)	544.61	6023.31	412.1	2326.6
21	Sodium(mg/L)	823.8	724.8	241.9	596.8
22	Potassium(mg/L)	10	11.8	9.9	10.56
23	Nitrate (mg/L)	N.D.	N.D.	N.D.	N.D.

All values expressed as mg/L except pH, EC and Temperature & N.D. Not detected.

4.2 FIGURES

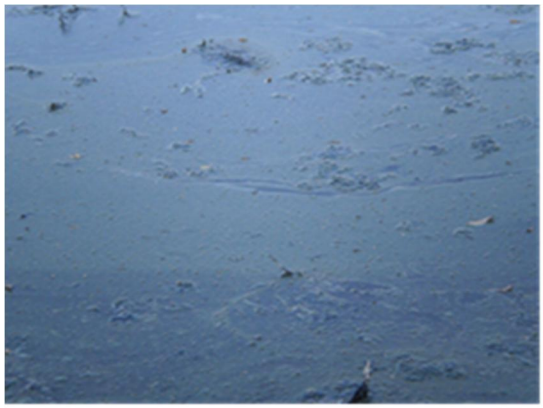

Fig. 3. Algal growth on surface of Lake

Fig. 4. Spirulina on surface lake water

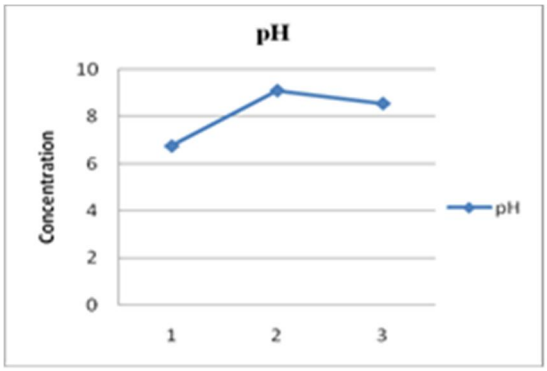

Fig. 5. Observed pH of water samples

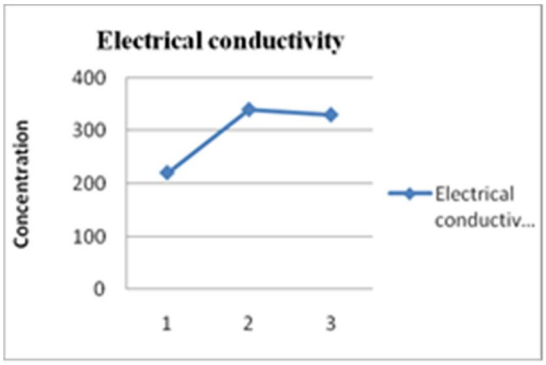

Fig. 6. Observed EC of water samples

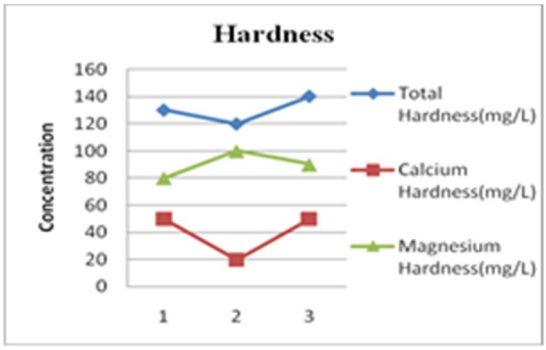

Fig. 7. Cons of Calcium, Magnesium & Total Hardness

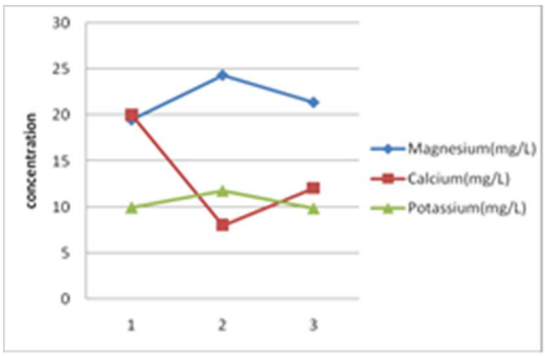

Fig. 8. Cons of Magnesium, Calcium & Potassium

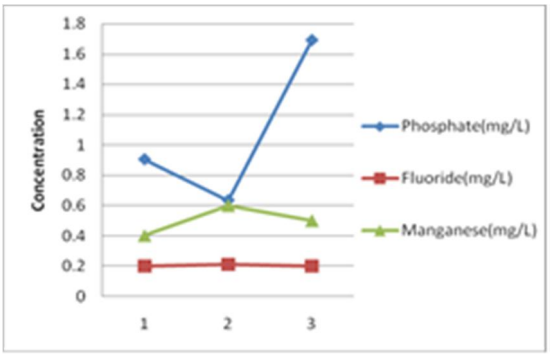

Fig. 9. Cons of Phosphate, Fluoride & Manganese

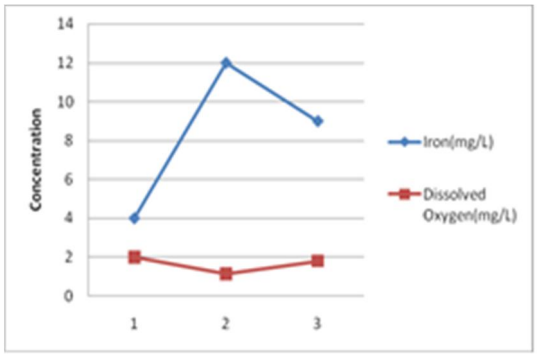

Fig. 10. Variations of Iron & D.O. in water samples

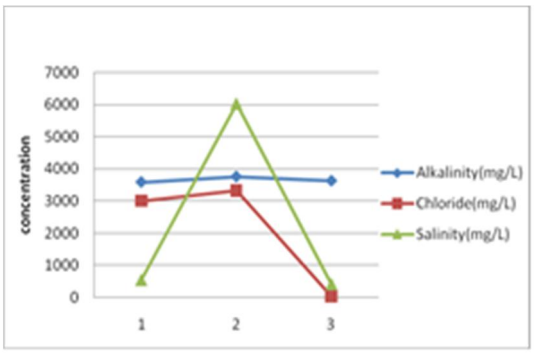

Fig. 11. Cons of Alkalinity, chloride & Salinity

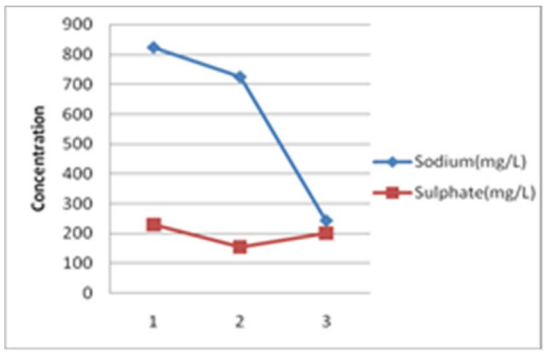

Fig. 12. Variation in Sodium & Sulphate in water samples

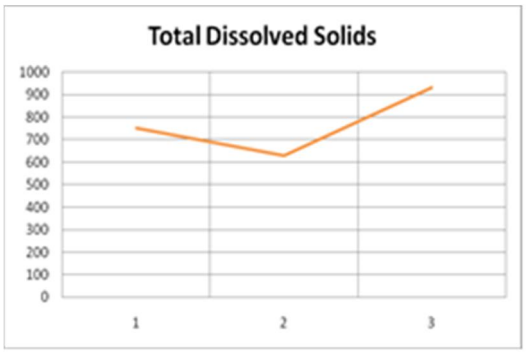

Fig. 13. Observed TDS in water samples

5 CONCLUSION

Here I find that the cultural eutrophication of this lake is takes place due to: The untreated domestic sewage and garbage coming out from Lonar town that reaches into the lake. Inside the crater, some farmers downing farming and hence the use of inorganic fertilizers, insecticides and pesticides like toxic compounds inters in lake. Simultaneously, Hygienic activities are carried out by the local people in the fresh water springs and used waste water enters in lake at last.

This *Spirulina* is amazing medicinal value like chlorophyll & lutein more than any other green plant or leafy vegetable. That can be use full for vigorous detoxification support for heavy metals and other toxins in the human body. So you can use this species for preparation of medicines for human body.

6 RECOMMENDATIONS

Recommendations will surely help to achieve the goal of conservation of Lonar Lake in future.

a) Source control or watershed/catchment treatment.
b) In-lake treatment: Algae may be destroyed in water by the addition of CuSO4. In small amounts, CuSO4 has not been shown to be toxic to man, but where fish are present in natural reservoirs, some fish may be affected.
c) Shore line treatment.
d) Public participation supported by court interventions, and
e) Education and training: By collecting this species of *Spirulina* from Lonar Lake you can use for sale to any medicinal industries preparing medicines form *Spirulina* species.

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Effet d'un stress salin sur la germination et l'activité enzymatique chez deux génotypes de *Medicago sativa*

[Effect of salt stress on germination and enzyme activity in two genotypes of *Medicago sativa*]

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ABSTRACT: The arid and semi-arid represent one third of the earth's surface. In these areas, soil salinity and irrigation water is one of the limiting factors for plant productivity and crop yields. These ecosystems are characterized by a high variability of rainfall combined with high evaporation favoring the accumulation of salts in the soil. This affects about 7% of the total area in the world. Germination of *Medicago sativa* is inhibited by 1.5% NaCl (260 mmol/l). Sodium chloride (NaCl) salinity is one of the major environmental factors that limit plant growth and productivity. In this study we tried to determine the effect of salt stress on germination of plants. For this, two alfalfa varieties were studied: Trifecta and Tafilalet that differ in their origins and their behavior to adapt to abiotic stress. Tafilalet ecotype from Morocco and Trifecta is a variety of Australian origin. To select the most tolerant alfalfa genotypes to salinity stress, an experiment was performed with three replications. The cultivar and salinity stress factors comprised two cultivars and tree levels of salinity stress (control, 100 and 200 mM) with NaCl, respectively. The all the results obtained showed that two genotypes contrasting for their sensitivity to salt stress exhibit behaviors that may differ in terms of response to salt stress, and indicate that a significant decrease was observed for mean germination in stress conditions.

KEYWORDS: *Medicago sativa*, germination, stress salin, enzymatic activity, Zymography.

RESUME: Les terres arides et semi arides représentent un tiers de la surface du globe. Dans ces zones, la salinité des sols et des eaux d'irrigation est l'un des facteurs limitant de la productivité végétale et du rendement agricole. Ces écosystèmes sont caractérisés par une forte irrégularité des précipitations associées à une importante évaporation favorisant l'accumulation des sels dans le sol. Ce phénomène affecte près de 7% de la surface globale dans le monde. La germination de Medicago sativa est inhibe par 1.5% de NaC1 (260 mmol/l), le Chlorure de sodium (NaCl) est l'un des principaux facteurs environnementaux qui limitent la croissance des plantes et la productivité. Durant cette étude nous avons essayé de déterminer l'effet du stress salin sur la germination des plantes. Pour cela deux variétés de luzerne ont été étudiées : Trifecta et Tafilalet qui diffèrent par leurs origines et leur comportement d'adaptation au stress abiotique. Tafilalet, écotype originaire du Maroc et Trifecta est une variété d'origine australienne. Pour sélectionner des génotypes de luzerne plus tolérantes à la salinité, une expérience a été réalisée avec trois répétitions. Le facteur de stress de salinité comprenait deux génotypes et trois niveaux de stress de salinité (contrôle, 100 et 200 mM NaCl), respectivement. L'ensemble des résultats obtenus montre que les deux génotypes étudiés pour leur sensibilité contrastée au stress salin présentent des comportements qui peuvent être différents en termes de réponse au stress salin. Ils indiquent aussi qu'une diminution significative a été observée pour la moyenne de germination dans des conditions de stress.

MOTS-CLEFS: *Medicago sativa*, germination, stress salin, activité enzymatique, Zymographie.

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1 INTRODUCTION

La luzerne est une des légumineuses fourragères les plus cultivées avec environ 32 millions d'hectares dans le monde en 1990, dont environ 13 millions pour l'Amérique du nord [1]. Comme les autres grandes légumineuses fourragères, la luzerne est une plante essentiellement récoltée après fauche. Elle ne constitue qu'une composante des systèmes fourragers, en complément des prairies et du maïs ensilage en France.

Les cultures fourragères au Maroc occupent environ 455 000 hectares dont 40% en système irrigué. Elles comprennent des espèces annuelles telles que l'avoine, le maïs fourrager, le pois fourrager et l'orge fourrager. Parmi les légumineuses fourragères cultivées au Maroc la luzerne est la plus abondante. Elle occupe 22% de la surface fourragère totale.

Le problème de salinité commence à prendre de l'ampleur dans la majorité des périmètres irrigués au Maroc, en particulier dans les régions arides et présahariennes. Dans ces régions, l'eau d'irrigation est souvent chargée en sel. La production de la luzerne, principale culture fourragère dans ces zones (85 000 ha), est fortement entravée par la salinité. Ce stress induit des déséquilibres nutritionnels qui conduisent dans certains cas à une sélectivité vis-à-vis du potassium pour faire face aux effets néfastes du sodium [2]. Dans d'autres cas, on assiste à une excrétion active du sodium [3].

Par ailleurs, une relation d'antagonisme a été notée entre K^+ et Ca^{2+} et entre Mg^{2+} et Na^+ [4].Les effets dépressifs de la salinité sur la luzerne affectent également la nodulation, la fixation symbiotique d'azote ainsi que le métabolisme azoté [5].

Un des avantages agronomiques principaux de la luzerne par rapport aux autres plantes fourragères repose essentiellement sur la régularité de sa production, notamment estivale, qui s'explique par l'existence d'un pivot très développé présentant une profondeur d'enracinement pouvant aller jusqu'à plus de 2 mètres.

Le taux élevé de sel dans les sols ou les eaux d'irrigation est une préoccupation environnementale majeure et un problème sérieux pour l'agriculture dans les régions arides et semi-arides, comme le bassin méditerranéen. En effet, l'excès de sel dans le sol affecte la germination, la croissance des plantules et leur vigueur, la phase végétative, la floraison et la fructification à des degrés variables conduisant à terme à des baisses de rendement et de qualité des productions [6], [7]. La tolérance au sel a été beaucoup étudiée chez les halophytes (végétaux adaptés aux milieux hypersalés ou par extension aux milieux à pression osmotique importante), pour comprendre les mécanismes développés pour leur adaptation [8].La tolérance au sel est un caractère complexe qui fait intervenir un ensemble de mécanismes chez les plantes. Plusieurs auteurs ont suggéré que la tolérance au sel ne peut être obtenue que par une pyramidisation de différents caractères [9].

2 MATÉRIEL ET MÉTHODES

Pour déterminer l'effet du stress salin sur la germination des plantes. Pour cela deux variétés de luzerne ont été étudiées : Trifecta et Tafilalet qui diffèrent par leurs origines et leur comportement d'adaptation au stress abiotique. Tafilalet, écotype originaire du Maroc et Trifecta est une variété d'origine australienne.

2.1 CULTURE ET TRAITEMENT DES GRAINES DE LUZERNE

Pour étudier l'effet de la salinité de degré variable sur la capacité de la germination, les semences de luzerne des 2 génotypes Trifecta et Tafilalet ont été mise à germer pendant 48h à 22°C, à l'obscurité. Ceci a été réalisé dans des boîtes de pétri (30graines) contenant trois couches de papier filtre imbibés par l'eau distillée pour les plantes « témoins ». Par contre le traitement « salinité » a consisté à apporter 50, 100 ou 200 mM de NaCl a l'eau distillée. On mesure la longueur des radicelles de chaque boite et 200 mg de chaque échantillon (radicelle seulement) a été mis placé dans un réfrigérateur à -4°C.

2.2 EXTRACTION DE PROTÉINES

1 ml du tampon d'extraction de protéines, on ajoute 200mg de l'échantillon et on commence le broyage jusqu'à l'obtention d'un broyat qu'on récupère dans des tubes d'eppendorf, et qu'on dépose dans la glace.

On centrifuge les tubes à 12000 tr/min pendant 15 min, puis le surnageant est centrifugé une deuxième fois pendant 10 min à 12000 tr/min. Ce dernier surnageant est récupéré dans d'autres tubes d'eppendorf et stocké à -20°C.

2.3 DOSAGE DES PROTEINES PAR LA METHODE DE LOWRY

Pour déterminer la concentration en protéines de chaque échantillon. On fait appel à une courbe d'étalonnage on utilisant des concentrations connues de protéines étalon à doser préalablement établies avec des standards contenant respectivement 0, 5, 10, 25, 40, 50, 75 et 100 µl de BSA (2µg/µl) toujours en ajustant à 100 µl avec de l'eau distillée.

Après, on prépare des tubes à hémolyse contenant 5 µl de chaque échantillon, complété à 90 µl avec le tampon de broyage, on ajoute ensuite 100 µl du réactif alcaline de cuivre. les mélanges sont agités et incubés à température ambiante (témoins + échantillon) pendant 10 min, on ajoute 100 µl du réactif Folin-Ciocalteu, et on agite quelques secondes. Après une deuxième incubation pendant 45 min à température ambiante, on fait une lecture de la DO à 750 nm [10].

2.4 SDS-PAGE EN PRESENCE DE LA GELATINE

La présence des protéases est mesurée par la méthode de zymographie. Le gel est alors incubé 18 heures à +37°C, permettant la dégradation du substrat protéique par les protéinases. Le gel est ensuite coloré au bleu de Coomassie. Seuls les endroits où le substrat protéique n'a pas été dégradé sont colorés en bleu. Il apparaît donc des bandes blanches indiquant la présence de protéinases. L'intensité de dégradation pour une bande est proportionnelle à la quantité de protéinase présente.

3 RÉSULTAT ET DISCUSSION

Le Tableau 1 représente l'effet de l'application du stress salin su la germination de la luzerne il représente le nombre de grains germé pour chaque variété en absence de NaCl dans le milieu la germination se déclenche quelque heures après le semis .après 60h la totalité des grains germe chez Tafilalet tandis chez Trifecta le nombre de grain germé augmente a 19 et reste constant même après 90 heures. Une augmentation de la concentration de NaCl à 200 mM inhibe la germination.

***Tableau 1** : représente le nombre de grains germé à toutes les concentrations chez les deux variétés et leurs pourcentages germinatifs*

	TAFILALET			TRIFECTA		
	0mM	100 mM	200 Mm	0 mM	100 mM	200 mM
24h	25	2	0	6	0	0
60h	30	25	1	19	11	0
90h	30	26	1	19	11	0
% Germination	100	86,66	3,33	63,33	36,66	0

On peut-on conclure que l'application d'un stress salin retard la germination à des faibles concentrations 100 mM et l'inhibe complètement à des concentrations plus fortes 200 mM.

Le pourcentage germinatif diminue aussi avec l'augmentation du degré de stress et aussi selon la variété, le pourcentage germinatif est plus faible chez Trifecta que chez Tafilalet, cette dernière qui présente une certaine résistance vis-à-vis le stress.

La figure 1 représente les différences de croissance des plantules entre les deux variétés sous différentes concentrations en NaCl. L'analyse de l'effet du stress salin sur la germination des graines par la mesure de la longueur des radicelles des plantules de luzerne montre un degré d'inhibition important chez Trifecta.

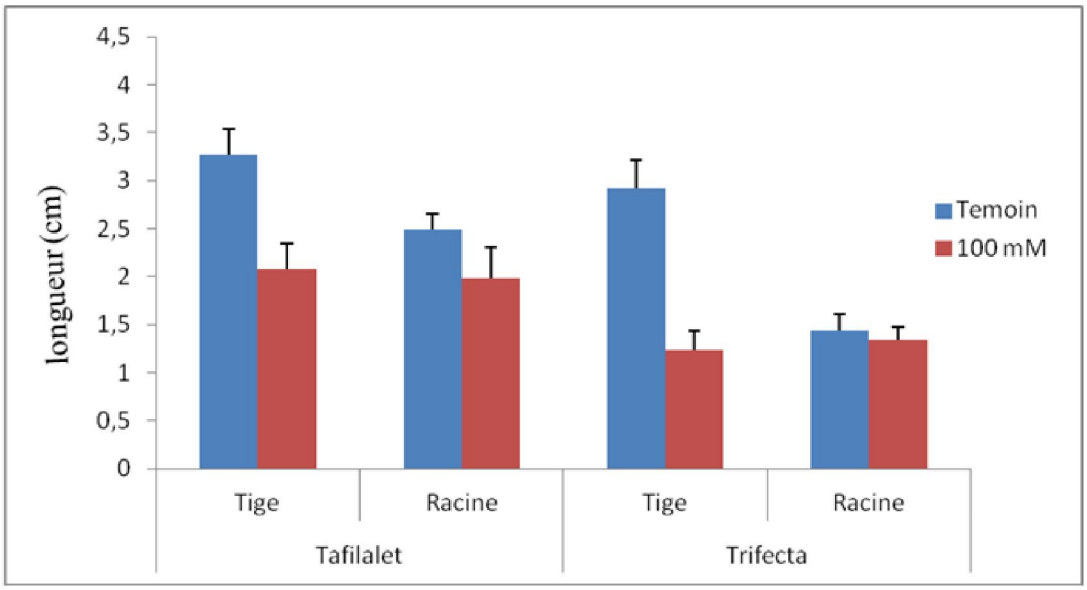

Fig. 1. La croissance de la tige et de la racine à différentes concentrations de NaCl chez Tafilalet et Trifecta

En absence de sel la germination de la variété Tafilalet est plus élevée, L'application de sel a provoqué une chute de germination des deux variétés. L'effet d'un apport de NaCl dans le milieu est plus important chez la variété Trifecta que chez Tafilalet. Par ailleurs et chez les deux variétés, aucune germination des semences n'a été enregistrée quand la concentration en NaCl dans le milieu atteint 200 mM.

D'après les résultats obtenus : après 96h nous pouvons remarquer que les plantules de la variété de Tafilalet représentent une taille de tiges et de racines plus grande que celle de Trifecta.

Ainsi, à 0 mM de NaCl : les deux variétés germent mais la variété Tafilalet présente un pourcentage germinatif et une croissance (de tige et de racine) plus élevée, indiquant des particularités propres pour chaque variété.

D'autres parts, à 100 mM de NaCl : le pourcentage germinatif et la croissance (de tige et de racine) ont diminué chez les deux variétés mais en restant toujours élevé chez la variété Tafilalet par rapport à Trifecta. Ainsi, la variété de Tafilalet semble avoir certaines propriétés lui permettant une meilleure résistance au stress salin.

3.1 SUIVI DE LA GERMINATION EN RECHERCHANT L'ACTIVITE ENZYMATIQUE (PAR ZYMOGRAPHIE) ET LES PROFILS PROTEIQUES (SDS-PAGE)

Pour mieux élucider ce phénomène, une zymographie en présence d'un substrat protéique, la gélatine, sur des extraits des plantules des deux variétés a été réalisée. Les résultats obtenus indiquent l'apparition d'une activité enzymatique intense à 0 mM de NaCl pour les deux variétés, qui diminue à 100 mM et disparait à 200mM en traitement en NaCl.

Ce résultat montre que la salinité a un effet inhibiteur sur la présence de l'activité des protéases qui seraient impliqué dans le processus de germination de la luzerne (Figure 2).

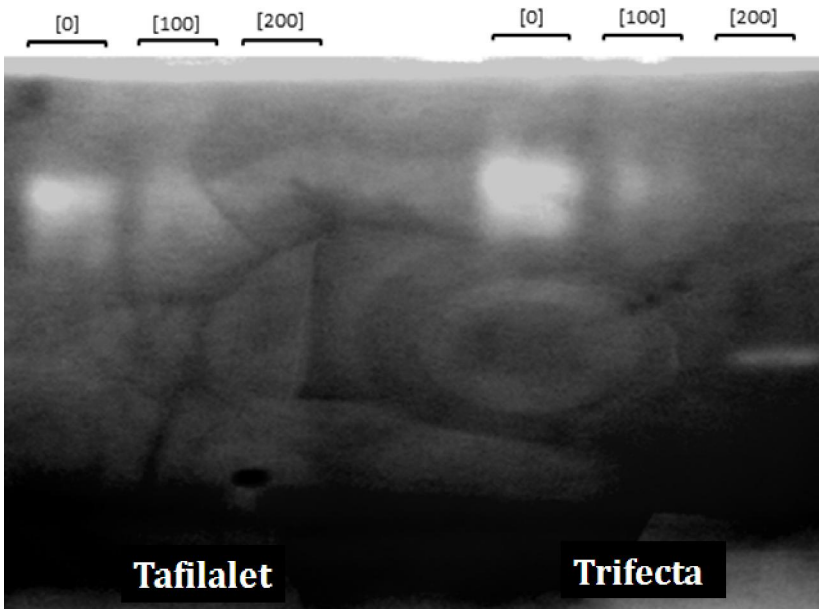

Fig. 2. Analyse zymographique sur gélatine des profils protéasiques des deux varietées de la luzerne (Tafilalt et Trifecta)

Grâce à une électrophorèse des protéines totales, on constate la présence de 5 bandes majoritaires (A, B, C, D et E) qui sont présents chez les deux variétés, ces bandes sont assez faible dans des faibles concentrations de NaCl (0,100) par contre à des concentrations de 200 mM en NaCl, les bandes sont beaucoup plus claires.

Quand nous analysons ces profils protéiques obtenus par électrophorèse sur SDS-PAGE (Figure 3), on constate qu'il y a différentes protéines qui sont exprimées dans la germination des deux variétés. On observe une absence des protéines dans les profils protéiques qui correspondent aux concentrations 0 et 100 mM de NaCl, ce qui indique la présence d'une activité enzymatique « protéases » qui dégrade ces protéines. Ce qui n'est pas le cas pour le profil qui correspond à la concentration de 200 mM. Autrement dit, avec la concentration en sel de 200 mM où il n y a pas de germination, les protéines restent intactes et ne se dégradent pas ce qui est en corrélation avec les résultats obtenus par zymographie où il n'y a pas d'expression de protéases à cette concentration en sel (figure 3). Par contre avec la germination, on remarque une diminution de bandes protéiques (A à E) en relation l'expression des protéases.

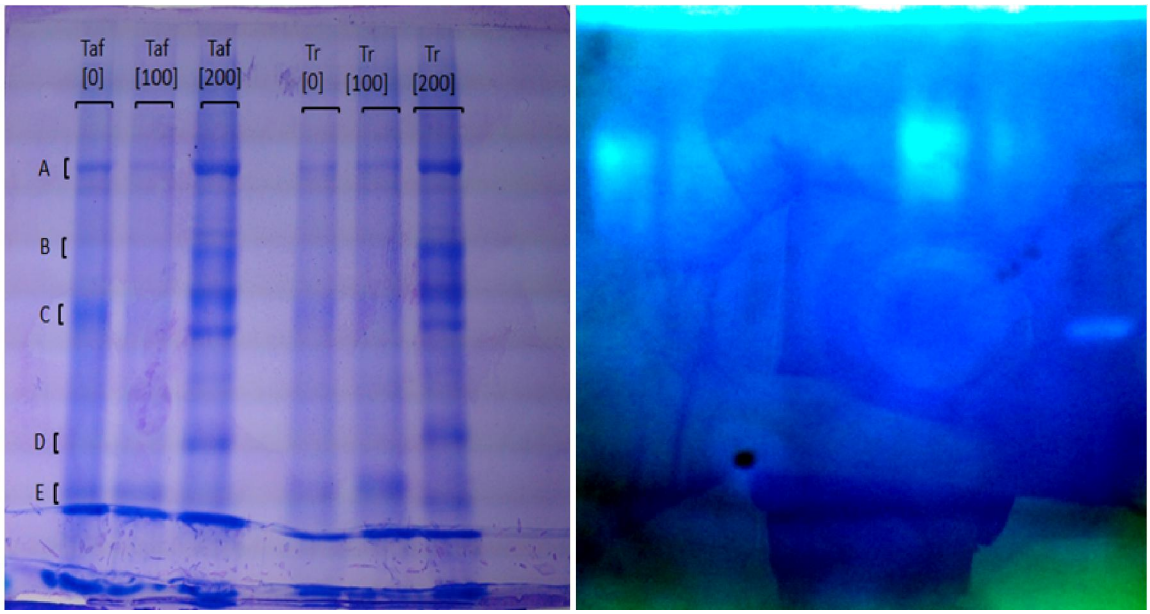

Fig. 3. A gauche, résultat de l'analyse des profils protéiques par électrophorèse sur SDS-PAGE des protéines totales des deux variétés de luzerne comparé aux profils protéasiques obtenus par zymographie (gel de droite)

Par ailleurs, quand on compare les profils protéiques (A à E), principalement pour la condition de non germination (NaCl 200 mM), on remarque quelques différences au niveau des bandes protéiques pour les deux variétés Tafilalt et Trifecta. C'est le cas par exemple des bandes protéiques D et E où l'on remarque le changement dans leurs positions (cas des bandes D) ou une faible expression (cas de la bande E moins exprimée dans la variété Tafilalt que Trifecta). Ces différences peuvent correspondre aux caractéristiques de chaque variété.

4 CONCLUSION

L'ensemble des données obtenues montre que les deux génotypes étudiés pour leur sensibilité contrastée au stress salin présentent des comportements qui peuvent être différents en termes de réponse au stress salin et les semences de Tafilalt et Trifecta ont des degrés de sensibilités différents à la salinité dans le milieu.

L'effet de la salinité sur la croissance de la tige et de la racine varie en fonction de la variété, la concentration de NaCl dans le milieu, et la durée du traitement. Donc la salinité provoque une inhibition de l'activité et de l'expression des protéases qui semblent être nécessaires pour la germination. Et la variété de Tafilalet présente plus de résistance envers le stress que celle de Trifecta.

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Etude et réalisation d'un onduleur autonome à circuit de commande Mc Murray Bedford

[Studies and set up of a circuit commanded autonomous inverter Mc Murray Bedford]

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ABSTRACT: Nowadays, it is known that every action made with the aim of contributing to reverse the global warming is appreciated according to its intrinsic value. Through the effect of economies of scale, together, the little actions made elsewhere are significant. If each person or every family in any area uses solar energy in all its domestic activities, the damage due to energy consumption in the world will be very low. This paper presents the command of an autonomous single phase converter with shifted command used to stabilize the energy produce by the photovoltaic cells in regard of the normal condition of usage. This shifted command aids in modifying the characteristics of the output voltage, particularly the effective value of its fundamental without involving the continue voltage of its energy supply. In multiple applications, it can be used in the energy supply of sensible devices like non synchronous machines. When this is jointed to a pump, it can produce drinking water by a tangential ultrafiltration unit of water with a perforated fiber. When it is combined to the command of the static converter of Mc Murray Bedford which is constituted of a monostich and a dephaser, commanded by the mutual inductance in order to obtain of a tension too close.

KEYWORDS: Solar, Static Converter, Inverter, Shifted command, Control circuit.

RESUME: Il est d'actualité et compris de tous qu'en cette période, chaque geste visant à contribuer à inverser le réchauffement climatique serait apprécié à sa juste valeur. Par effet d'économie d'échelle, la somme des petits gestes produirait forcément un résultat visible et appréciable. Si chaque individu ou chaque famille dans sa vie domestique courante s'approprierait l'énergie solaire, la marche énergétique du monde actuel sera certainement différente. Cet article présente la commande d'un onduleur autonome monophasé en pont, à commande décalée, destiné à la stabilisation de l'énergie produite par des cellules photovoltaïques en vue d'une utilisation dans les conditions nominales. Cette commande décalée permet de modifier les caractéristiques de la tension de sortie, en particulier la valeur efficace de son fondamental sans avoir à intervenir au niveau de la tension continue d'alimentation. A application multiple, on pourrait s'en servir par exemple dans l'alimentation des dispositifs sensibles tels que des machines asynchrones. Le couplage de ces dernières à des pompes pourra servir à alimenter une unité de filtration d'eau tangentielle à fibres creuses destinée à la production d'eau potable en zones reculées. Associé au circuit de commande du convertisseur statique de Mc Murray Bedford constitué d'un monostable, d'un astable et du circuit déphaseur, commandé par la mutuelle inductance pour une obtention d'une tension plus proche d'une sinusoïde, ses performances se trouvent améliorées.

MOTS-CLEFS: Solaire, Convertisseur statique, Onduleur, Commande décalée, Circuit de commande.

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1 INTRODUCTION

Disposer d'une source de courant alternatif à partir d'un générateur délivrant une tension constante est le rôle dévolu aux convertisseurs statiques que sont les onduleurs. La structure d'un onduleur étant liée à la charge, nous distinguerons les onduleurs assistés par la charge et les onduleurs autonomes.

La charge peut être à fréquence fixe (réseau), ou à fréquence variable (machine variable). L'onduleur est ainsi vu comme une interface entre une source de courant continu et une charge alternative grâce à un ensemble de composants électroniques à fonctionnement bien réglé. C'est ainsi qu'il existe deux principaux types de convertisseur continu-alternatifs : les convertisseurs tournants et les onduleurs autonomes [1]. Commandé de façon symétrique ou décalée, ce dernier type désigne des circuits à source continue qui, par commutation appropriée de dispositifs de redressement tels que les transistors ou les thyristors, donne une tension alternative synthétisée**.** La commande décalée permet d'obtenir une tension proche de la sinusoïde. Ce qui n'est pas le cas de la commande symétrique [2]**.** Les onduleurs autonomes peuvent fonctionner à deux, quatre ou dix thyristors [3]**.** Cependant, les deux derniers cas présentent l'avantage d'être alimentés par une source de tension continue, fixe ou variable et de pouvoir être commandés par la méthode décalée.

Si dans le domaine du convertisseur peu de choses ont été ajoutées à la structure traditionnelle de l'onduleur, l'étude des nouveaux circuits de commande a apporté des améliorations considérables dans les onduleurs à thyristors au niveau de la souplesse de commande et de la fiabilité de fonctionnement. Le fonctionnement des thyristors du circuit de puissance de Mc Murray Bedford est à l'origine de la conception du circuit de commande. Dans le montage en demi-pont, la tension aux bornes des condensateurs fluctue toujours, ce qui rend difficile l'équilibrage du pont. Le montage en pont, bien que plus complexe est de plus en plus utilisé comparé au montage en demi-pont. Grace à son fonctionnement à trois états, on obtient des ondes rectangulaires décalées dont la tension de sortie a une forme plus proche de la forme sinusoïdale que la commande symétrique. L'utilisation d'un tel circuit pour la réalisation d'un convertisseur continu-alternatif, d'alimentation des machines ou autres, a comme but et principal intérêt de modifier les caractéristiques de la tension de sortie, en particulier la valeur efficace de son fondamental sans avoir à intervenir au niveau de la tension continu d'alimentation ainsi que l'amélioration de ses performances.

Cet article dans ses articulations, présente tout d'abord le titre Matériel et Méthodes qui montre en détail le circuit de commande de l'onduleur monophasé en pont de Mc Murray Bedford, alimentant les charges puis le titre résultats et discussion et enfin la conclusion.

2 MATERIEL ET METHODES

2.1 MATERIEL

Dans le cadre de ce travail, nous avions utilisé un oscilloscope de marque PHILIPS, modèle PM3215 de bande passante 50 Hz afin de visualiser les différents chronogrammes. De même que, des plaques photovoltaïques de marque NAPS-SA type NP50G type NP50G ont été utilisés afin d'alimenter des pompes d'un équipement d'ultrafiltration d'eau marque Multi-Inox 34 ES.

2.2 METHODES

Le schéma synoptique de principe d'un onduleur autonome synthétisé pour alimenter une charge est donné à la figure 1.

Dans le fonctionnement de principe d'un onduleur autonome, la tension continue est appliquée alternativement par le groupe de convertisseurs positifs, puis par le groupe de convertisseurs négatifs, à chaque demi-bobinage des inductances à point milieu. Il en résulte un flux magnétique aux bornes des inductances qui induit une onde de forme pseudo sinusoïdale aux bornes de la charge.

La génération des signaux de commande des thyristors nécessite l'élaboration :

- la réalisation d'une tension de synchronisation;
- la détection des passages à zéro de la tension de synchronisation et la réalisation d'un retard du signal de commande par rapport à cette tension de synchronisation;
- la production d'un train d'impulsions nécessaires à la fermeture sûre des thyristors commandés.

L'environnement global de notre onduleur autonome à deux bras est donné par le schéma de l'annexe 1. Son mode de fonctionnement est le suivant :

T est la période du courant alternatif que nous désirons faire passer dans le récepteur, nous posons : $\omega = 2\pi/T$ et $\theta = \omega t$.

Les quatre thyristors sont ouverts et fermés selon la séquence indiquée sur la figure suivante :

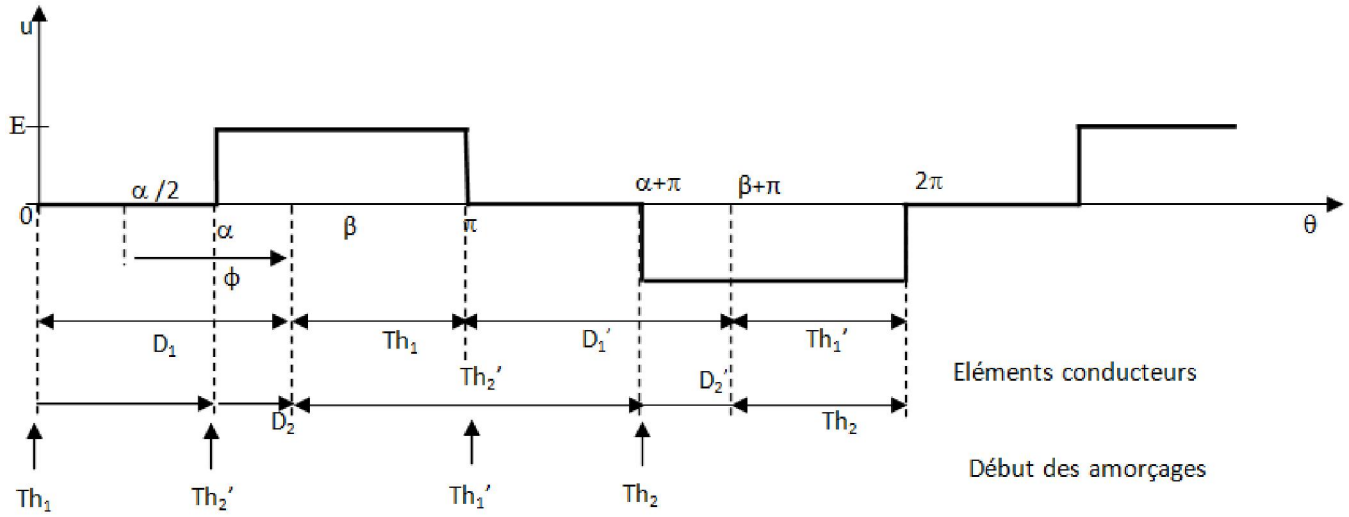

Fig. 1.Séquence de fonctionnement des thyristors dans un onduleur en pont

De plus, les thyristors Th_2 et Th_2' ont par rapport aux thyristors Th_1 et Th_1' un décalage en θ caractérisé par α qui représente l'angle d'amorçage des thyristors. *θ* est l'angle correspondant à la transition entre l'état positif et ou négatif du courant. En considérant successivement les quatre intervalles suivants, le principe de fonctionnement de l'onduleur en pont se présente comme suit :

- Intervalle (0, α) : le courant **i**, négatif, circule le long de la maille :

N → récepteur → M → D_1→ Th_2 → N. Le récepteur est court-circuité par D_1 et Th_2 ⇒ u = 0 ; d'autre part, le générateur ne débite aucun courant ⇒ i'= 0.

- Intervalle (α, π) : lorsque θ = α, on bloque Th_2 si bien que le courant **i**, toujours négatif, se met à circuler le long de la maille :

N → récepteur → M → D_1 → A → générateur → B → D_2' → N ; M étant relié à A et N à B ⇒ u = V, d'autre part le courant **i** traverse le générateur dans le sens A → B : **i'** est donc négatif comme **i** ⇒ **i'** = **i** < 0.

Dès que **i** devient positif (θ = β), il emprunte le parcours :

M → récepteur → N → Th_2' → B → générateur → A → Th_1 → M.

En effet Th_1 est amorcé depuis θ = 0 et Th_2' depuis θ = α ; on a toujours u = E et **i'**= **i** mais ces deux courants sont désormais positifs.

- Intervalle (π, α + π) : lorsque θ = π, on bloque Th_1, ce qui oblige le courant **i**, positif à cet instant à circuler le long de la maille:

M → récepteur → N → Th_2' → D_1' → M; le récepteur est à nouveau court-circuité (par D_1' et Th_2'); donc u = 0 et **i'**= 0.

- Intervalle (α + π, 2π) : lorsque θ = α + π, on bloque Th_2' si bien que le courant i positif à cet instant, se met à circuler le long de la maille:

M → récepteur → N → D_2 → A → générateur → B → D_1' → M;

M étant relié à B et, N à A ⇒ u = -E ; d'autre part le courant **i** traverse le générateur dans le sens A → B : **i'** est donc négatif ⇒ **i'** = - **i** < 0.

Dès que **i** devient négatif ($\theta = \beta+\pi$) il emprunte le parcours :

N → récepteur → M → Th_1' → générateur → A → Th_2 → N ; en effet Th_1' est amorcé depuis $\theta = \pi$ et Th_2 depuis $\theta = \alpha + \pi$; on a toujours u = -E mais désormais **i'** est positif :

i' = - **i** > 0.

En définitive, il existe trois sortes de régimes.

- Dans les intervalles (0, α) et (π, π + α), le récepteur est court-circuité par une diode et un thyristor.
- Dans les intervalles (α, β) et (α + π, β + π), le récepteur renvoie du courant dans le générateur par l'intermédiaire de deux diodes: ce sont les intervalles de récupérations.
- Dans les intervalles (β, π) et (β + π, 2 π), le récepteur est alimenté par l'intermédiaire de deux thyristors; le générateur débite le courant i' tel que :
  i' = **i** lorsque Th_1 et Th_2' conduisent et **i'** = -**i** lorsque Th_2 et Th_1' conduisent.

2.2.1 EXPRESSIONS DE TENSION ET DU COURANT AUX BORNES DE LA CHARGE

La tension **u** étant 2π périodique, il en est de même du courant i.

Le fondamental de **u**, $\mathbf{u}_f = \hat{\mathbf{u}}_f \sin(\theta - \alpha/2)$ avec $\hat{\mathbf{u}}_f = [4E\cos(\alpha/2)]/\pi$ donne naissance au fondamental $\mathbf{i}_f$ du courant **i** donc la démonstration se présente comme suit:

La tension u(t) est une fonction périodique de période $T=2\pi/\omega$. Sa décomposition en séries de Fourier est de la forme :

$u(t) = a_0 + \sum_{1n=1}^{\infty}[a_n\cos(n\omega t) + b_n\sin(n\omega t)]$, les coefficients a_0, a_n et b_n sont données par les formules d'Euler :

$a_0 = \frac{1}{T}\int_{-T/2}^{T/2} u(t)dt$, $a_n = \frac{2}{T}\int_{-T/2}^{T/2} u(t)\cos(\omega nt)dt$ et $b_n = \frac{2}{T}\int_{-T/2}^{T/2} u(t)\sin(\omega nt)\,dt$ [3-4].

Calculons les expressions de a_0, a_n et b_n.

On a :

Pour $0 \le \theta \le \alpha$ et $\pi \le \theta \le \pi+\alpha$, $u(\theta) = 0$;

Pour $\alpha \le \theta \le \pi$, $u(\theta) = E$;

Pour $\pi+\alpha \le \theta \le 2\pi$, $u(\theta) = -E$;

Calculons a_0

Par définition, $a_0 = \frac{1}{2\pi}\left\{\int_0^{\alpha} 0d\theta + \int_{\alpha}^{\pi} Ed\theta + \int_{\pi}^{\pi+\alpha} 0d\theta + \int_{\pi+\alpha}^{2\pi} -Ed\theta\right\}$

$= \frac{1}{2\pi}\{E(\pi - \alpha) - E(2\pi - \pi - \alpha)\}$

$= 0$

Calculons a_n

Par définition, $a_n = \frac{2}{2\pi}\int_0^{2\pi} u(\theta)\cos(n\theta)d\theta$

$= \frac{2}{2\pi}\left\{\int_{\alpha}^{\pi} E\cos n\theta\, d\theta + \int_{\pi+\alpha}^{2\pi} -E\cos n\theta d\theta\right\}$

$= \frac{E}{\pi}\left\{\frac{1}{n}[\sin(n\theta)]_{\alpha}^{\pi} - \frac{1}{n}[\sin(n\theta)]_{\pi+\alpha}^{2\pi}\right\}$

$= \frac{E}{n\pi}\{(-1)^n\sin(n\alpha) - \sin(n\alpha)\}$

$= \frac{E}{n\pi}\{((-1)^n - 1)\sin(n\alpha)\}$

On a donc: $a_n = \frac{E}{n\pi}\{((-1)^n - 1)\sin(n\alpha)\}$

Calculons b_n

Par définition $b_n = \frac{2}{2\pi}\int_0^{2\pi} f(\theta)\sin(n\theta)\,d\theta$

$$b_n = \frac{2}{2\pi}\left\{\int_\alpha^\pi E\sin(n\theta)\,d\theta + \int_{\pi+\alpha}^{2\pi} -E\sin(n\theta)d\theta\right\}$$

$$= \frac{E}{\pi}\left\{-\frac{1}{n}[\cos(n\theta)]_\alpha^\pi + \frac{1}{n}[\cos(n\theta)]_{\pi+\alpha}^{2\pi}\right\}$$

$$= \frac{E}{n\pi}\{(1-(-1)^n) + \cos(n\alpha)(1-(-1)^n)\}$$

On a donc: $= \frac{E}{n\pi}\{(1-(-1)^n)(1+\cos(n\alpha))\}$

Ainsi donc:

$$u(\theta) = \sum_1^\infty E/n\pi\{((-1)^n - 1)\sin(n\alpha)\}\cos(n\theta) + E/n\pi\{(1-(-1)^n)(1 + \cos(n\alpha)\}\sin(n\theta)$$

$$= \sum_1^\infty \frac{E}{n\pi}\{(-1)^n\sin(n\alpha) - \sin(n\alpha)\}\cos(n\theta) + \sum_1^\infty \frac{E}{n\pi}\{(1-(-1)^n)(1+\cos n\alpha)\}\sin(n\theta)$$

Pour n = 1 (signal du fondamental), on aura :

$u(\theta) = \frac{E}{\pi}(-2\sin\alpha\cos\theta + 2(1+\cos\alpha)\sin\theta)$

$= \frac{2E}{\pi}((\sin\alpha\cos\theta - \sin\alpha\cos\theta) + \sin\theta)$

$= \frac{2E}{\pi}(\sin(\theta-\alpha) + \sin\theta)$

$= \frac{4E}{\pi}\sin(\frac{\theta-\alpha+\theta}{2})\cos(\frac{\theta-\alpha-\theta}{2})$, car $\sin(a)+\sin(b) = 2\sin\frac{a+b}{2}\cos\frac{a-b}{2}$

$u(\theta) = \frac{4E}{\pi}\cos(\frac{\alpha}{2})\sin(\theta-\frac{\alpha}{2})$

D'où $u_{max} = \frac{4E}{\pi}\cos\frac{\alpha}{2}$

Le récepteur étant supposé résistif et inductif, on a :

$\mathbf{i}_f = [\hat{\mathbf{u}}_f \sin(\theta - \alpha/2 - \phi)]/(R^2 + L^2\omega^2)^{1/2}$ avec, $\tan\phi = L\omega / R$.

Outre l'onduleur, ce circuit comporte :

- un multivibrateur ou oscillateur à relaxation qui génère deux signaux carrés de rapport cyclique 1/2 complémentaires, V_{C4} et V_{C5} à la période $T = [R_8C_6 + R_7C_4]\ln 2$ [5].

- un détecteur de passage par zéro et retardateur (déphaseur) le TCA 785. Il est synchronisé sur le signal V_{C4}, dérivé par un condensateur pour les passages à zéro soient détectables par l'entrée. Il produit les signaux V_{14} et V_{15} respectivement retardés de Δt, donc décalés proportionnellement de $\Delta\theta = 2\pi\Delta t/T$ par rapport à V_{C5} et V_{C4}. T = 1/f est la période des signaux V_{C4} et V_{C5} [2].

- des portes logiques distribuant, en fonction des valeurs de V_{C4}, V_{C5}, V_{14} et V_{15}, les impulsions d'un générateur de créneaux, l'astable avec la *NE 555*), à la période $T' = (R_1+2R_2)C_3\ln 2$. Les circuits de commande des thyristors (amplificateur de puissance et transformateur d'isolement) en sont les destinataires [6-7] et [12].

Afin d'assurer la protection des charges (pompes par exemple), il lui est associé un régulateur à deux seuils contrôlant leurs mises en routes. Ces seuils peuvent être réglés suivant les plages de fonctionnement des charges en tension (tension minimale et maximale).

Le circuit de puissance de notre convertisseur, constitué des thyristors est celui de Mc Murray Bedford, commandé par la mutuelle inductance [3]. Il produit une tension de sortie efficace $u_{max} = \frac{4E}{\pi}\cos\frac{\alpha}{2}$, avec α : angle de retard à l'amorçage et V la tension d'entrée [8].

Afin d'alimenter le circuit commande de l'onduleur en des tensions normalisées, il a été conçue une alimentation stabilisée du circuit de commande autour des transistors T1, T3 montés en Darlington [9], [10] et [11].

2.2.2 CONTRAINTE D'UTILISATION DU CONVERTISSEUR

Les pompes que le convertisseur doit alimenter possèdent des caractéristiques qu'il convient de respecter. Ces contraintes portent sur la tension d'alimentation. Les tolérances sur la tension sont très souvent importantes du fait qu'une surtension gênante provoquera un échauffement du moteur qui peut causer sa destruction. Afin d'assurer la protection de nos pompes, il faudrait mettre sur pied un régulateur de tension à deux seuils, vu la plage de fonctionnement de la pompe en tension (tensions minimale et maximale) contrôlant leurs mises en route. Notons par:

- $V_x = R_{30}E/ (R_{29}+R_{30})$ où V_P est la tension fournie par les panneaux solaires (variable).

- V_{Z1} et V_{Z2} : les tensions de seuil minimal et maximal correspondant à la plage de fonctionnement de nos pompes.

- $\varepsilon_A = V_x - V_{Z1}$: tension d'entrée différentielle de l'amplificateur opérationnel A.

- $\varepsilon_B = V_x - V_{Z2}$: tension d'entrée différentielle de l'amplificateur opérationnel B.

Le fonctionnement du système peut être décrit comme suit:

- $\varepsilon_B > 0 \rightarrow V_x > V_{Z2}$

  → La tension de sortie de l'amplificateur opérationnel B (V_{SB}) est au niveau logique 1.

  → Quel que soit la valeur de V_{SA}, le transistor T_1 est bloqué.

  → Ouverture de l'interrupteur K_F ouvert, la pompe est à l'arrêt pour défaut de suralimentation.

- $\varepsilon_B < 0 \rightarrow V_x < V_{Z2}$

→ V_{SB} est au niveau logique 0, et $\varepsilon_A > 0 \rightarrow V_x > V_{Z1} \rightarrow V_{SA}$ est au niveau logique 1, alors T_1 sature mettant la pompe en marche.

- Si par contre $\varepsilon_A < 0$ on aura : $V_x < V_{Z1} \rightarrow V_{SA}$ est au niveau logique 0.

  → T_1 bloqué.

  → La pompe est hors service défaut de sous alimentation.

En définitive, nous pouvons récapituler le fonctionnement du circuit de protection de nos pompes dans le tableau logique suivant :

Tableau 1. Tableau logique de fonctionnement du circuit de protection de nos pompes

V_{SA} (tension de sortie de l'amplificateur opérationnel A)	**V_{SB}** (tension de sortie de l'amplificateur opérationnel B)	Etat du transistor T_1	Comportement de la pompe
0	0	Bloqué	Arrêt
1	0	Saturé	Fonctionnement normal
1	1	Bloqué	Arrêt

3 RESULTATS ET DISCUSSIONS

Les courbes des figures 3 à 10 montrent les chronogrammes de chaque circuit bloc de notre convertisseur continu – alternatif. Ces chronogrammes sont rigoureusement identiques à ceux prévus en théorie**.** Non seulement ils sont conformes à la théorie, mais surtout d'une grande stabilité.

L'application de cette réalisation à la conversion continue-alternative de l'énergie solaire, pour l'alimentation des pompes d'un équipement d'ultrafiltration de l'eau dont les caractéristiques sont données dans le tableau ci-dessous, a donné de très bons résultats.

Ici, la tension continue est produite par la mise en série de huit(8) plaques photovoltaïques, aux caractéristiques également portées dans ce même tableau.

Tableau 2. Caractéristiques des plaques photovoltaïques

Caractéristiques	Tension	Courant	Fréquence	Puissance	Hauteur
Pompe de marque Multi-Inox 34 ES de classe F	220 V~	3 A	50 Hz	700 W	40 m max
Plaque solaire de marque NAPS-SA type NP50G (nombre de modules 8)	21,6 V	3,35 A	Continu	50 W	Sans importance

Cette application aurait pu s'arrêter à la production d'une source d'énergie continue ou alternative. Les applications seraient déjà nombreuses notamment le désenclavement en besoins énergétique, communicationnel, informationnel, de conservation alimentaire, bref du minimum de confort à une vie moderne telle que rencontrée dans nos grandes métropoles.

En abordant le problème de traitement des eaux grâce au couplage énergie solaire-conversion-unité de filtration d'eau, nous nous sommes attaquées à au moins 50 % des causes de problèmes de santé dans les pays en développement qui, pour l'essentiel, ont pour origine la mauvaise qualité de l'eau.

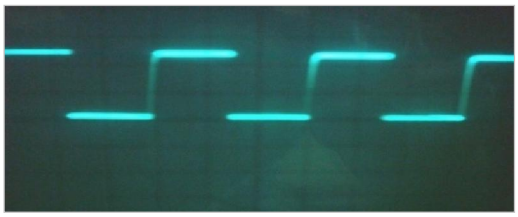

Fig. 2. Signal V_{C4} au collecteur de l'oscillateur à relaxation (5V/div. – 5ms/div.)

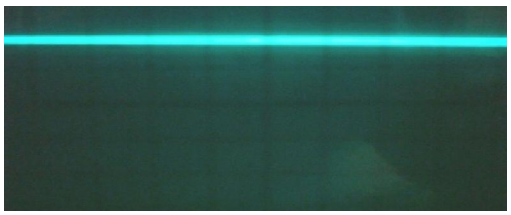

Fig. 3. Tension stabilisée V_{Z3} (5V/div. – 5ms/div.)

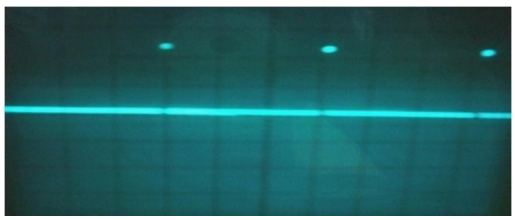

Fig. 4. Signal V_{14} au à la sortie du TCA 785 (5V/div. – 5ms/div.)

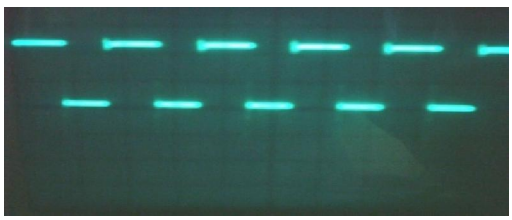

Fig. 5. Signal de sortie de la NEE555 (5V/div.-5ms/div.)

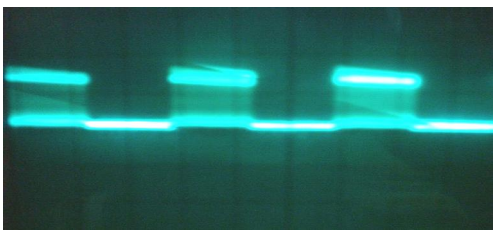

Fig. 6. Signal de la porte AND (5V/div.- 0,1ms/div.)

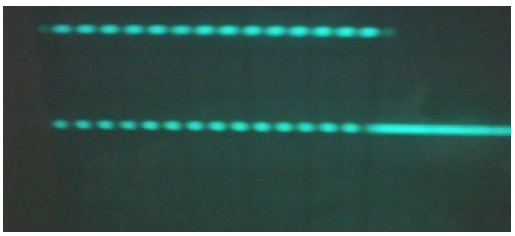

Fig. 7. Salves d'impulsions (5V/div.-5ms/div.)

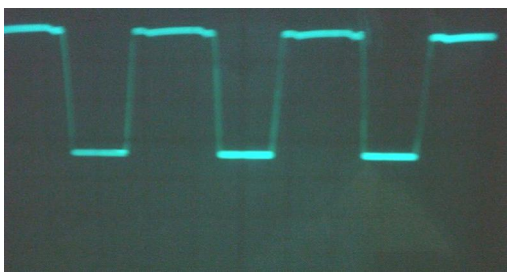

Fig. 8. Signal aux bornes de la cathode-anode (5V/div.- 0,1ms/div.)

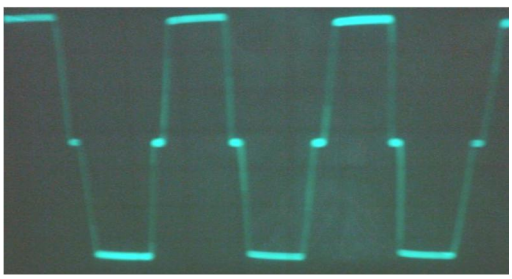

Fig. 9. Signal de sortie de notre d'un onduleur autonome monophasé (5V/div.-5ms/div.)

4 CONCLUSION

L'étude de la conversion continu-alternatif nous a permis grâce à l'étude des multivibrateurs (à transistor et avec la *NE555*), d'un circuit déphaseur, des modules de salves d'impulsions et du circuit de détection de la tension à deux seuils d'élaborer d'une part le circuit d'amorçage d'un pont à quatre thyristors de l'onduleur MC. Murray Bedford et d'autre part le circuit de protection afin d'obtenir une tension alternative monophasée permettant ainsi d'alimenter plusieurs équipements. C'est le cas de la pompe d'une unité d'ultrafiltration d'eau. La régulation de cette dernière par rapport à son débit serait nécessaire.

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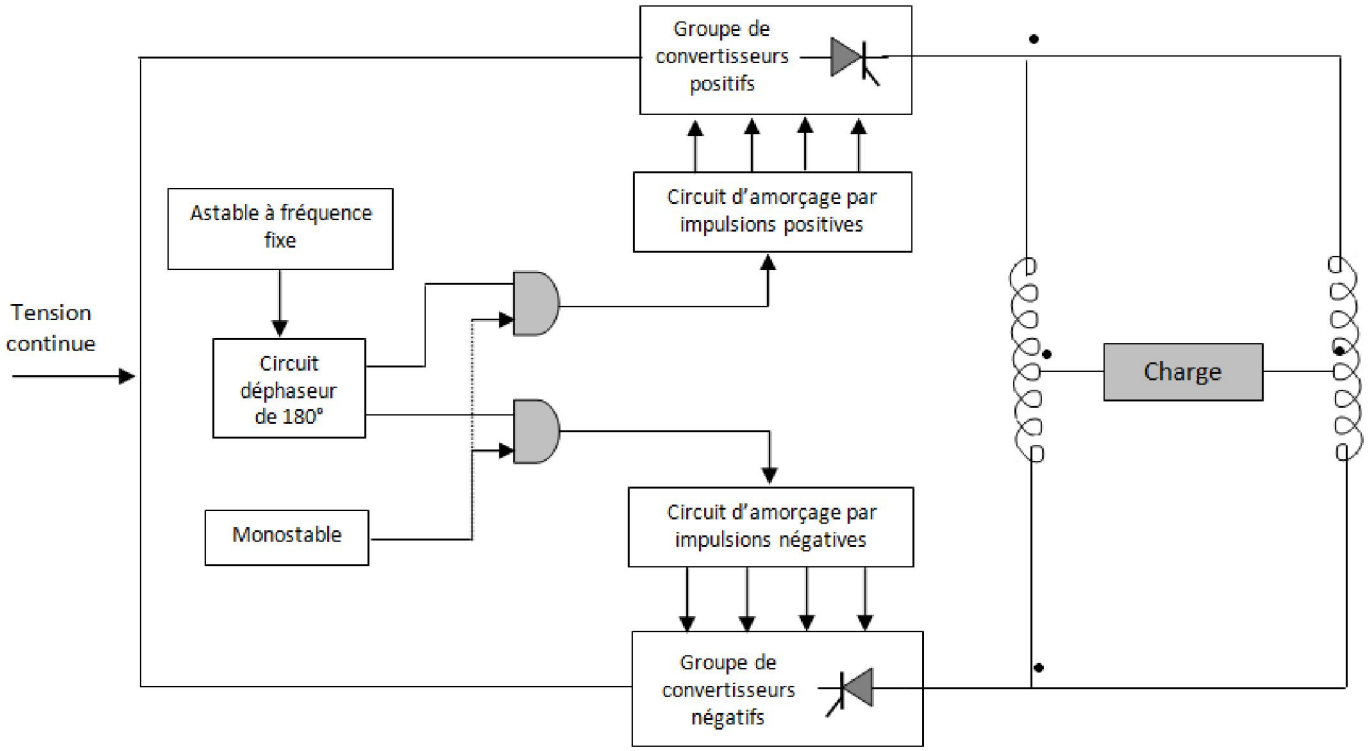
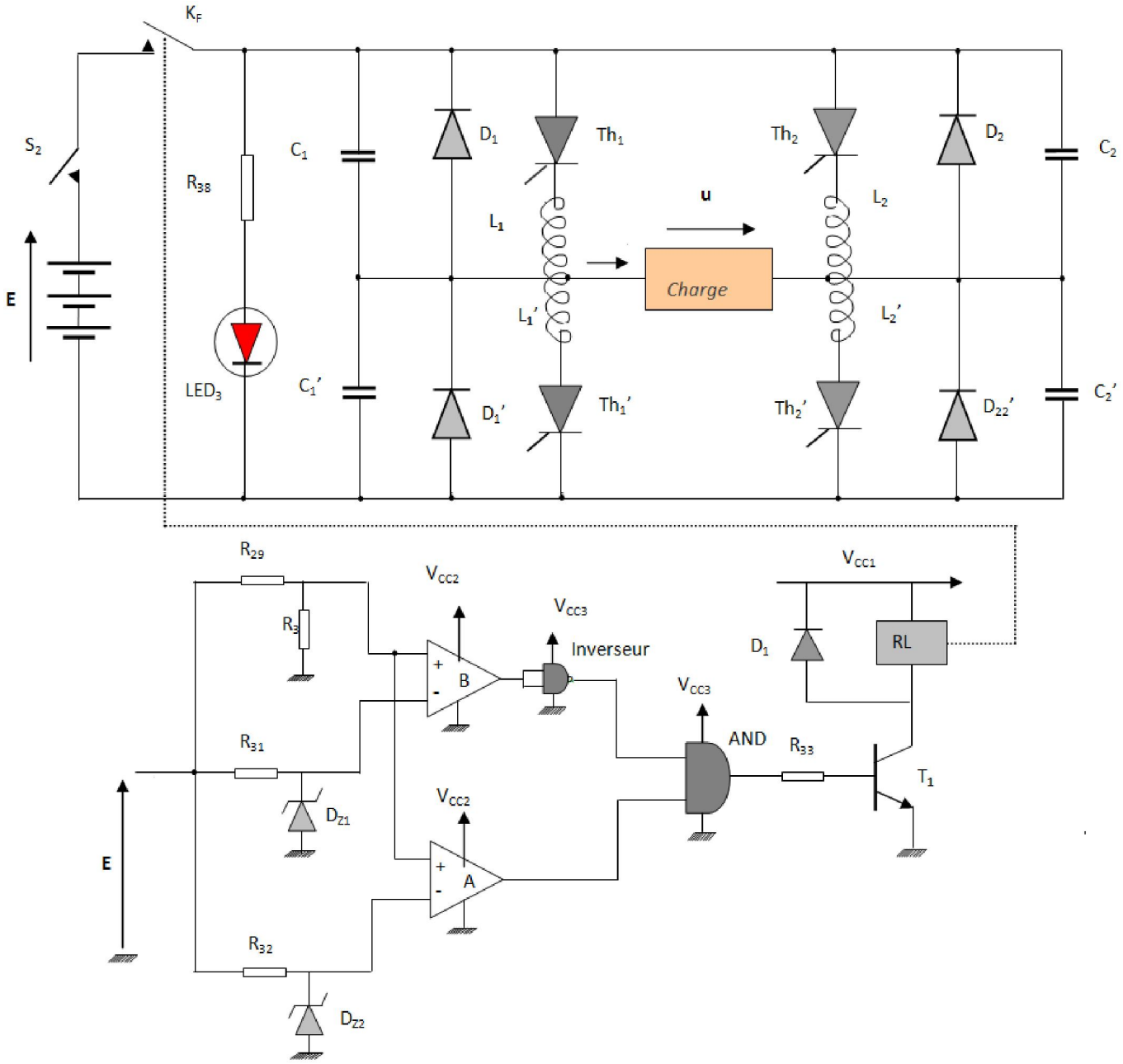
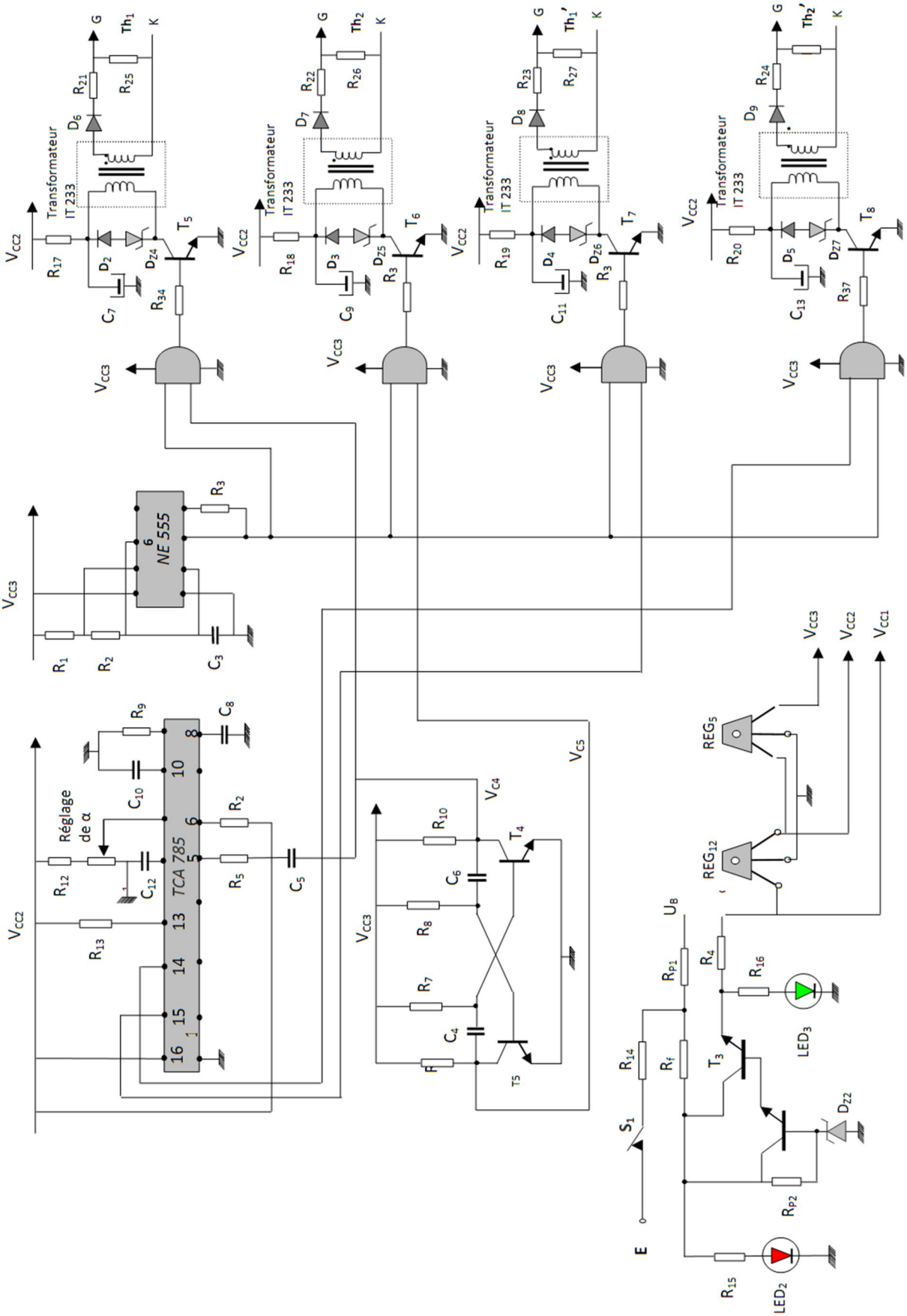
ANNEXE I. ***Synoptique général d'un onduleur autonome avec inductances à point milieu***



ANNEXE II. ***Circuit de puissance de l'onduleur autonome monophasé à deux bras***



ANNEXE III. *Circuit de commande de l'onduleur autonome monophasé à deux bras (Suite)*



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Hardware Virtualization towards a Proficient Computing Environment

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ABSTRACT: In the recent few years Server Virtualization and Green Information Technology have become very popular and are fast becoming the norm in organizations of all disciplines and sizes. Today, different methods of energy savings are in use and in great demand. One of the newest methods in the IT to control the pollution of the environment and the greenhouse effect is Green IT that is directly connected with the Virtualization of Hardware Resources.

Virtualization is the presentation of an environment to one layer in an information technology stack that abstracts or represents a lower layer. It makes it possible for the IT professional to run a number of machines on a single physical machine.

In this study we elicit the concept of Hardware Virtualization. We illustrate the procedure of Hardware Virtualization using a real-world example and then we emulate a virtualized infrastructure to contrast against the physical infrastructure on the basis of CPU utilization. We have used the VMware Workstation 7.1.0 as a software tool for virtualization and AVG PC Tune Up 2011 to present the difference in CPU utilization before and after virtualization.

This paper helps to identify the main reasons for the growing need for data centre virtualization. The results in this paper show that a virtualized infrastructure can potentially increase the CPU utilization by a significant margin, thereby suggesting an efficient and faster way of resource utilization, saving processing time, reducing the cost incurred in building separate physical servers and furthermore reducing the power consumption.

KEYWORDS: Server virtualization, Green information technology, Carbon footprint, CPU utilization, Greenhouse effect, separation, controlled sharing.

1 INTRODUCTION

1.1 HISTORY

Virtualization has been, for a long period of time, in the spotlight of the contemporary information technology. Virtualization software makes it possible for the IT professional to run a number of virtual machines on a single physical machine. VMware, a mainstream virtualization software vendor, gives an overview of virtualization [1] and the history that led up to the popularity of this technology. In the 1960s IBM implemented virtualization as a way to partition mainframe computers. However, in the 1980s and 1990s the popularity of virtualization diminished as more affordable hardware became available. Hardware continued to become more affordable and at the same time more powerful, and the utilization levels fell to less than 10%. The increased focus on better hardware utilization and the drive to reduce the data centre's carbon footprint has revitalized the need for virtualization technology. Various software packages are available on the market and VMware is one of the more popular packages available, with over 170,000 customers at the time of writing.

1.2 ADVANTAGES OF A VIRTUALIZED INFRASTRUCTURE

- Virtualization reduces the amount of hardware required by a data centre. **Less hardware** can be maintained on **less power.** As a result the harmful impact on the environment is reduced thereby lending a hand to the **Green IT.**

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- Application of the virtualization technologies vary for use in **simulations** and **testing** of new applications as well as in testing its coexistence.
- A virtual infrastructure is suitable for a few basic but strong security primitives [2] namely, separation and controlled sharing. Hypervisors (term discussed ahead) have traditionally supported strong isolation or separation of Virtual Machines (VMs) and their workloads, including fault isolation limiting an application or operating system fault's effects within a VM.

A system can achieve separation in several ways:

- Using different hardware facilities for different workloads (physical separation).
- Running workloads at different times (temporal separation).
- Cryptographically protecting workload-specific data (cryptographic separation), and
- Using a reference monitor [3] or security kernel to separate workloads and their resources (logical separation or isolation).
- Moreover, a virtualized infrastructure also brings about better **utilization of processor** and **resources** such as hardware.
- It also reduces the **floor space** requirements of an organization.
- Therefore virtualization proves to be a viable option for any organization which wants to **save funds.**

1.3 THE CONCEPT

Virtualization software decouples the software from the hardware by creating an abstract layer, known as a ***hypervisor***, between the virtual machine and the host operating system. The hypervisor acts as a controller between the hardware and the virtual machines. Its function is to monitor the virtual machines, dynamically assigning the hardware to the virtual machines as and when the hardware is required.

Hypervisors, by their functionalities, can be divided into two groups:

- *Type one hypervisor or native* which is run directly on the server hardware and is called bare – metal hypervisor.
- *Type two hypervisor*, *or hosted*, which is in fact an application run in operating system installation.

To accomplish the best efficiency hypervisors of type one are used the most because the operating system is not needed. Type two hypervisors are applicable to simulation and testing environments because it can be run both on client and server versions of the operating systems and in the environments with insufficient hardware resources.

Here, it is also important to understand what a *Host Machine* is? In context of virtualization, Host machine refers to the computer which has one or more virtual machine installed on it, running as the host for the virtual machines [4]. **Fig.1** shows the infrastructure of a Virtualized Host Machine.

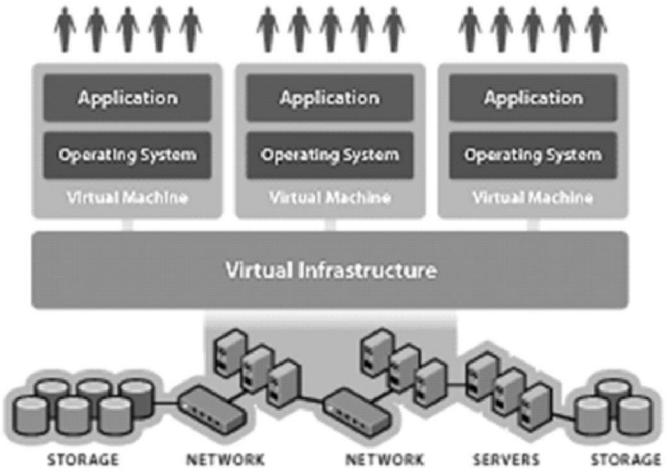

Fig. 1. Virtualized Host Machine

Virtualization software is based on one of three fundamental technologies, namely **full virtualization, paravirtualization** and **hardware assisted virtualization**. VMware [5] explains the key differences between the three virtualization technologies as follows:

Full virtualization is believed to be the most popular form of virtualization. With this ***technology*** all operating systems can be installed on a virtual machine without the need for modification. The hypervisor manages CPU instructions and controls the virtual machine's access to the hardware. The operating system is not aware that it is running in a Virtual environment and that its access is being controlled by the hypervisor.

OS assisted virtualization or paravirtualization is used to overcome the high processor overhead that is created in the full virtualization technique. In this technique the guest operating system is modified to make it aware that it is running on a virtual machine. The virtual machine is then aware of the hypervisor and collaborates with the hypervisor to reduce the overhead on the processor.

Hardware assisted virtualization can be achieved by using hardware that have been developed with features that assist virtualization techniques. This technique requires he hardware vendor to incorporate an inflexible programming model in the product and as a result this virtualization technique is not commonly used.

The rest of the paper is organized as follows: Section II presents related works and case studies where virtualization has proved to reduce the demand for hardware and power consumption and the consequent reduction of carbon emissions. Section III elaborates our virtualized infrastructure setup. In section IV we describe the procedure. In section V we present the data analysis. We conclude in section VI and discuss scope for future work in section VII. In Section VIII we list the references.

2 RELATED WORKS AND MOTIVATION

Extensive investigations to establish the energy requirements of IT data centres has shown that the hardware in data centres are generally underutilized, causing electricity to be wasted. A report compiled by the Environmental Protection Agency [6] found that hardware is not only underutilized, but the energy requirements of data centres in the United States have doubled in the period from 2000 to 2006.

Numerous case studies have proven that server virtualization has the potential to reduce energy consumption, subsequently saving the company money. In 2008 the Royal Borough of Windsor and Maidenhead virtualized 184 of their physical servers . This resulted in a 44% reduction on the council's energy bill; a saving of £1.2 million. The pension company, Standard Life, virtualized 65% of its physical servers. This freed up nearly two thirds of the occupied floor space in the server room. The virtualization also resulted in a saving of £300K per annum on the company's electricity bill. The UK retailer, Tesco, implemented server virtualization technology to reduce 1,500 physical servers to only 120 servers. The IT Director, Nick Folkes explained that the virtualized infrastructure requires less power and is simpler to manage. Frangiskatos et al. states that server virtualization could result in the need for additional security measures to be implemented, however, reiterates the fact that virtualization simplifies the management of data centres.

In August 2005 the energy company E.ON [8] migrated their existing physical IT infrastructure to a virtualized infrastructure. The company required a flexible environment with the ability to accommodate all the individual IT requirements of the separate business units. A virtual environment met these requirements. Following the move to virtualization, E.ON reported a 56% reduction in power consumption. The heat in the data centre was also reduced by more than half [9].

The related works establish a strong argument to utilize the full potential of the virtualization technology in order to reduce the ever increasing demand for computer hardware and electrical energy supply, increase the CPU utilization and provide every advantage that virtualization brings with itself.

3 VIRTUALISED INFRASTRUCTURE SETUP & CPU UTILIZATION

In our setup for estimating the CPU utilization we have used Full Virtualization, as discussed in section I.

In this setup we have used the following hardware and software:

- Lenovo R500 laptop (Processor: 2.26GHz, RAM: 2 GB, OS: Windows 7Ultimate).
- Samsung PC (Processor: 2.20GHz, RAM: 1 GB, OS: Windows 7 Ultimate).
- CPU usage indicator software (AVG PC Tune Up 2011)

Virtualizations software: VMware Workstation Version 7.1.0 was used to create virtual machines.

Virtual machines created for the analysis: Red Hat Enterprise Linux 5 and Windows 7 Ultimate.

Fig. 2. The complete setup

For our purpose we define **CPU Utilization** as the time spent by the computer not in idle state. We assume that:

CPU Utilization = CPU Usage

Therefore, we can use CPU Usage as a measure of CPU Utilization.

4 PROCEDURE

Non Virtualized V/S Virtualized

For recording the results from a **Non-Virtualized Infrastructure**, we installed AVG PC Tune Up 2011 on one of the machines. Then we connected both the machines (the machines specifications have been mentioned in the previous section) on LAN and recorded the CPU usage readings by running the usage indicator software (AVG PC Tune Up 2011) in **Table 1** in section V.

For recording the results from a **Virtualized Infrastructure** we installed VMware workstation on the same machine on which we installed AVG PC Tune Up 2011. We refer to this machine as the Host machine. Then we created two Virtual Machines (VM) by using VMware Workstation, having Linux Operating systems on one VM and Windows 7 Ultimate on the other. First we ran Linux - VM1 (refer **Fig.3**) and recorded the CPU Usage readings from AVG Tune Up software (refer **Fig.5**). Then we shut down Linux (VM1) and ran Windows 7 Ultimate - VM2 (refer Fig.3) and recorded the readings for it in Table 1. Finally we took the average readings for all the three cases mentioned above and recorded them.

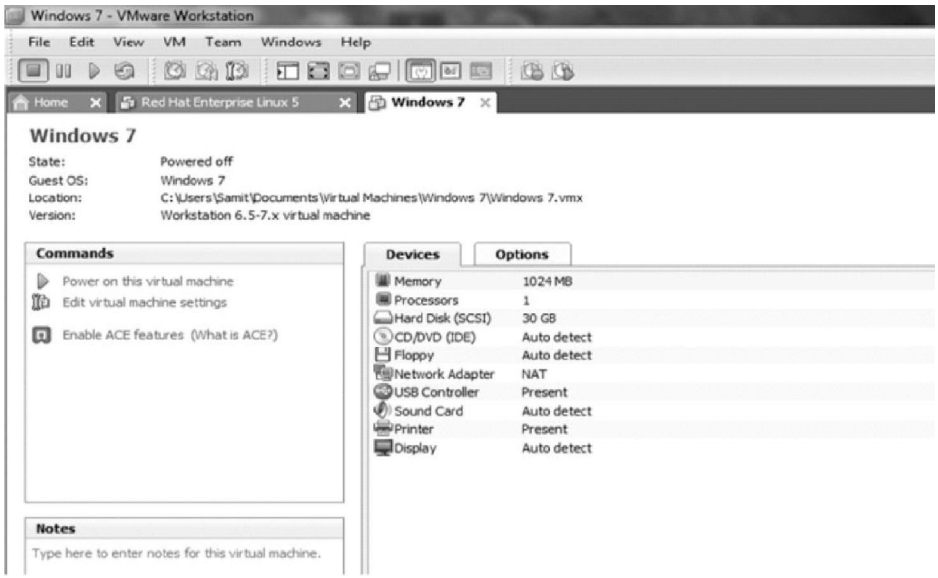

Fig. 3. Virtual Machines on VMware

Fig. 4. Applications running on the host machine

Fig. 5. CPU Usage

5 DATA ANALYSIS

Table 1, shown below gives the CPU Usage readings obtained from AVG PC Tune Up 2011 for all the three cases:

- No virtualization
- Virtualization-Linux Virtual Machine
- Virtualization-Windows 7 Virtual Machine

Table 1. CPU Usage readings obtained from AVG PC Tune Up 2011

Readings	No virtualization (%)	Linux VM (%)	Windows7 VM (%)
1.	2	9	24
2.	4	20	16
3.	3	12	9
4.	5	10	12
5.	51	13	24
6.	2	18	16
7.	5	11	17
8.	2	12	13
9.	3	8	21
10.	2	6	16
11.	3	12	17
12.	5	19	19
13.	2	27	6
14.	3	18	25
15.	2	11	14
16.	4	12	11
17.	5	8	14
18	2	10	26
19.	48	11	18
20.	2	14	27
Average	**7.75**	**12.55**	**16.5**

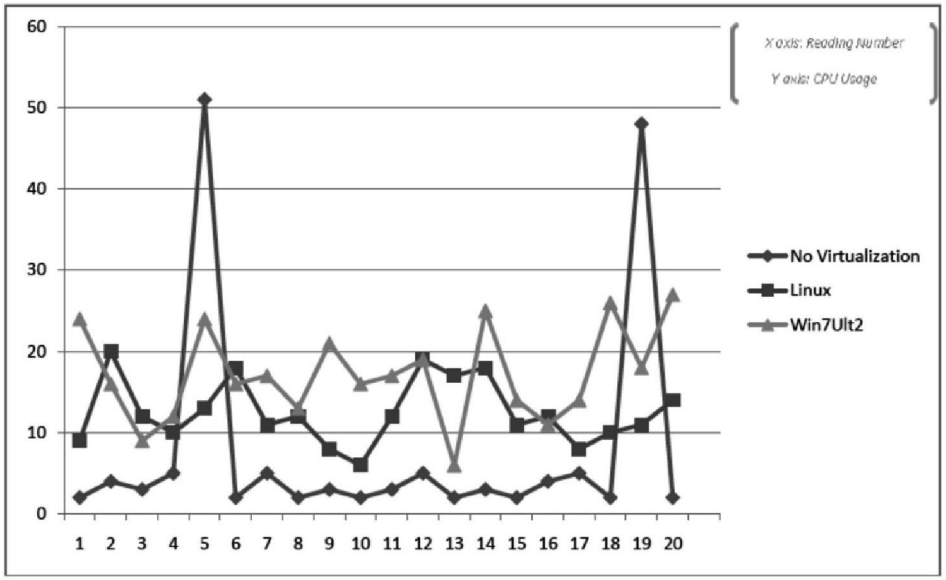

Fig. 6. Graphical representation of the recorded readings

Increment in CPU Usage:

- **Linux VM**

IncLinux = Usage (VM1) - Usage (No Virtualization)

= 12.55% - 7.75% = 4.8%

- **Windows 7 Ultimate VM**

IncWindows = Usage (VM2) - Usage (No Virtualization)

= 16.5% - 7.75% = 8.75%

From the above analysis we observed that the CPU usage increases by 4.8% in case of **Linux Virtual Machine** and **8.75%** in case of **Windows 7 Virtual Machine.**

As we assumed:

CPU Utilization = CPU Usage

We can also say that CPU utilization increases by **4.8%** in case of **Linux Virtual Machine** and **8.75%** in case of **Windows 7 Virtual Machine**.

6 CONCLUSIONS

This case based study compared physical and virtualized infrastructure on the basis of CPU utilization. Two virtual machines were created for this purpose using **VMware Workstation 7.1.0**. The readings were taken using **AVG PC TUNE UP 2011**. We observed an increment of **4.8%** in case of **Linux Virtual Machine** and an increment **8.75%** in case of **Windows 7 Virtual Machine.** in the CPU Utilization. Therefore we can say that virtualization is a better alternative to running separate physical machines. If we apply Virtualization technology in data centres the amount of hardware required would reduce thereby decreasing the floor space requirements significantly. Furthermore, it would also save power, reducing the carbon footprints. In other words Virtualization saves the company's funds and also paves way for a greener tomorrow.

7 FUTURE WORK

There is a lot of scope for future work. Firstly we have performed our experiment on a small scale. The same method applied on a large scale would be significantly beneficial. Secondly, a difference was observed in the CPU utilization of Linux and Windows operating systems. Thorough evaluation is needed to understand the reason behind this. Third, the power savings from a virtualized environment need further exploration. It is believed that a company with more than five physical servers should invest in virtualization technology. Also further the carbon emissions could be calculated by using the nameplate ratings provided by the manufacturer of the machine so that we get an idea about the harmful impact on the environment. For future work we can also consider using paravirtualization or hardware assisted virtualization and compare results with that obtained from full virtualization. Another avenue that could be further investigated is the sustainability of the virtual environment.

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Dynamic Clustering and Prioritization in Vehicular Ad-hoc Networks: Zone Based approach

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ABSTRACT: Vehicular Ad hoc Network (VANET) is new network type which is used for short range high speed communication among vehicles and between vehicles and road side infrastructure units. In most of the existing literature, the gateways are considered static, deployed on the road side at fixed distance from each other, depending on their transmission range, which makes the overall system costly. The proposed work is for enabling the mobile data access for vehicle anytime and anywhere. Dynamic clustering of vehicles is used to achieve this access of mobile data in vehicles. Clustering is done here based on zone based approach and by considering the dwelling time of vehicles with their velocity. Dwelling time of a vehicle is the time of that vehicle that resides in a particular range. Zone based clustering is similar to normal clustering but all of the members of this clusters can act as cluster head. The different clusters can be overlapping each other. The velocity of vehicles taken here are 40m/s, 60m/s, 80m/s and 100m/s. The velocities of vehicles in same track have same velocities for simplifying the simulation. Requirements of vehicles such as ambulance, fire service vans are crucial during emergency situations. Hence such vehicles need to be given a high priority in this network architecture. Prioritization of vehicles can be done by considering inter vehicular communication property calculating the deviation of vehicular velocities.

KEYWORDS: Prioritization, Dynamic Clustering, Dwell time, Vehicular Ad-hoc Network, Wireless Access in Vehicular Environment.

1 INTRODUCTION

It is possible giving birth to a new network type called Vehicular Ad hoc Network (VANET), along with the advances in dedicated short range communication and wireless technologies. VANETs are used for short range high speed communication among vehicles and vehicles and road side infrastructure units. Collision avoidance can be achieved by exchanging warning messages between vehicles by using vehicle to vehicle communication.

A Vehicular Ad-Hoc Network is a new technology in which the moving vehicles are turn into moving nodes in a network. When a vehicle turn out of signal range, this will drop out and another vehicle can come instead of this vehicle.

UMTS (Universal Mobile Telecommunications System) is a third generation mobile cellular system which uses wide band code division multiple access technique. It is based on GSM standard and DEVELOPED and maintained by 3GPP. It ensures the delivery of multimedia services to the users in mobile range.

Wireless Access in Vehicular Environment (WAVE) comes in the case of short duration communication in fast changing environment where the broadcasting of large amount of data is difficult. IEEE 802.11p forms the standard for WAVE which is the enhanced version of IEEE802.11a.

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1.1 REVIEW OF LITERATURE

In the existing systems, the gateways considered as static which is not suited for the dynamic nature of vehicles. The dynamic clustering of vehicles is depicted in [1]-[2]. The normal dynamic clustering methods are detailed in this papers.ZRP protocol is detailed in [3]. This is similar to normal clustering methods but all of its members can act as cluster head. The properties of zone based approach are also depicted in [4]. This approach can use both the advantage of proactive and reactive nature of vehicles. So the ZRP is best suited example of hybrid routing protocol.

For achieving high speed and short range communication the VANET is integrated with UMTS networks. The properties of UMTS (Universal Mobile Telecommunication System) and Vehicular ad hoc networks are detailed in [5], [6]-[7]-[8] and [9]. UMTS provides delivery of multimedia message to the user in mobile domain. VANET provides communication among different vehicles and communication between the vehicles and neighboring equipments.

IEEE 802.11p is best suited for the Vehicular networks because it provides better performance compared to IEEE 802.11a. The details of IEEE 802.11p are depicted in [10]-[11]. The better performance is for WAVE protocol as compared to the normal protocols. The performance evaluation is detailed in [12]. Handover of messages in dynamically arranged vehicles are greatest challenge. The method of handover technique is depicted in [13]-[14]. The Mac and PHY layer is enhanced in the case of IEEE 802.11p as compared to IEEE 802.11a. The MAC layer of IEEE 802.11a is known as simple MAC and that for IEEE 802.11p is known as enhanced MAC [15]-[16].

Data dissemination in vehicular ad hoc networks is explained in [17]. Dissemination of data in dynamic vehicular environment is briefly explained in the paper. RSU based frame work dissemination is explained. Prioritization of data access is also an important factor in the vehicular ad hoc networks. The reliable reception of important message is also a challenge in the network. Priority access can be possible EDCA mechanism [18]. Mobility impact on IEEE 802.11p MAC performance is in [19]. A detailed explanation of deviation of vehicles and the level of priority is explained.

2 METHODOLOGY

The topology of the proposed work is depicted in fig.1. The scenario considers two different Lanes over a particular road (e.g, highway), with each Lane for each direction. Communication of vehicles are possible with the road side base stations. These road side equipments are considered to be static and they are deployed in fixed distances. The performance of the network is evaluated in terms of Throughput, Packet Delivery Ratio (PDR), and Delay parameters.

The performance evaluation is done for communication among different Lanes and between Lanes and the comparison of parameters throughput, PDR and Delay is performed in the communication among Lane1, Lane2, from Lane1 to Lane2 and from Lane 2 to Lane 1. Overall performance also evaluated.

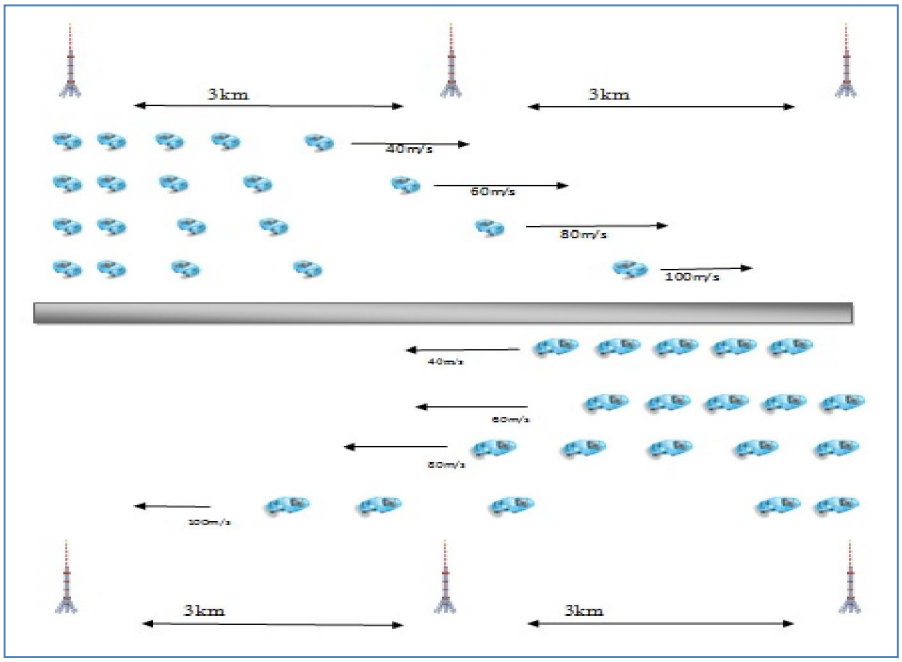

Fig. 1. Proposed Model for Vehicular Network

2.1 CLUSTERING- ZONE BASED APPROACH

Clustering is the grouping of vehicles based on similar characteristics. Zone based clustering is similar to normal clustering with the exception that every node act as a cluster head and a member of other clusters. The protocol used here is Zone Routing Protocol (ZRP). In this, zone is formed by a number of ad hoc nodes within one, two or more hops away from central nodes. In ZRP, Proactive approach is used. Route updates are performed in nodes. So each node has a route to all other nodes within the zone.

In this work zone based clustering is done with slowest vehicle among the vehicles which are in range as the cluster head. Here BSTs are deployed in fixed distances from each other. So we can calculate the location of vehicles from the dwelling time and velocity of the vehicle as shown in the table 1.

When the nodes move from one zone to other it informs the following node and the cluster head of the future zone. The handoff is done when the node move from one node to another. Clustering is done based on the direction and the transmission range.

2.2 BASED ON TRANSMISSION RANGE

The transmission range of the vehicles can be calculated from the velocity of the vehicle and the Dwelling time. The relationship between velocity and dwelling time is shown in Table 1. The base stations are situated at fixed distance from each other. So it is assumed that the transmission region changes after each of their dwelling times. When the vehicle changes from one transmission range to other it will inform the previous zone head node.

Table 1. Relation between velocity and dwelling time

Velocity (m/s)	Dwelling time
40	75.27
60	50.26
80	37.39
100	30.06

2.3 BASED ON DIRECTION

The road is divided into two lanes which are towards different direction. This is considered for this type of clustering. The direction of vehicles whether it is towards or away from base stations also considered.

2.4 PRIORITIZATION

In this proposed architecture inter-vehicular communication is also possible. By using this property vehicles can be prioritize according to their needs. Certain vehicles such as ambulance, fire service vans need to be given a high priority in the envisioned network architecture, as their requirements are crucial during emergency situations. Higher priority vehicles cannot be act as cluster heads. These vehicles continuously deliver messages to the vehicles which are going in front of them. When those vehicles are received this messages they will change their path for the higher priority vehicles and clear the route for them.

A MAC scheme is proposed for the prioritization of vehicles. The concept used here is that, the deviation of the node speed from the average speed of the neighbors is proportional to the level of channel access priority. We can relate the channel access time to the node velocity is to adjust the contention window size to provide service priority. For a transmitting node, i, with a velocity, V_i, the deviation from the average speed V_{avg} is given in equation (1)

$$d = |V_i - V_{avg}| \quad (1)$$

Where, V is the average speed of the (M - 1) one-hop neighbors in the cluster. For simplicity in implementation, vehicles are categorized into different classes based on their speed deviations from the average speed [44].

3 RESULTS AND DISCUSSIONS

The proposed clustering based Vehicular Ad Hoc Network is implemented in network Simulator tool 2. IEEE 802.11p is used as the protocol here. The simulation parameter is given in table 2. The performance of the network is evaluated in terms of Packet Delivery Ratio, Throughput, and number of packets Dropped, End- End Delay which is defined as follows.

- Throughput is the average rate of successfully transmitted data packets over the communication network.
- Packet Delivery Ratio (PDR) is defined as the ratio of the total number of successfully transmitted data packets to the total number of data packets sent from the source to the destination.
- Dropped Packets ratio is the ratio of difference between total number of packets sent from source to destination and the total number of successfully transmitted data packets to the total number of packets delivered.
- End to End Delay refers to the time taken for a packet to be transmitted across a network from source to destination.

Performance of the network based on the above parameters are evaluated under IEEE 802.11a and IEEE 802.11p. We can understand that the performance under IEEE 802.11p is better compared to IEEE 802.11a. The comparison of performance under these two situations are given in the table 3. There is 2.2% improvement in the case of IEEE 802.11p when Packet Delivery Ratio comparison is done. When we done the analysis of network with the parameter Throughput we can see that there is 22.26 % of improvement When we use IEEE802.11 p. From these analysis we can understand that IEEE 802.11p is more suitable for VANET.

Table 2. Simulation Parameters

PARAMETER	VALUE
Area	10000 x 1200 (m^2)
Channel	Channel/Wireless Channel
Propagation model	Propagation/Nakagami
Network Interface	Phy/WirelessPhyExt
Interface Que Type	Queue/DropTail/PriQueue
Interface Queue length	20 packets
Total number of VANET vehicles	20
Routing protocol	AODV
Peak mobility speed	100m/s
Transport layer protocol	TCP/Newreno
MAC Interface	Mac/802.11Ext
Antenna Type	Antenna/OmniAntenna
Application	FTP

After the performance evaluation dynamic clustering of vehicles are done by using zone based approach. Zone based approach is done by considering the dwelling time of vehicles. In this method all the cluster members can act as the cluster head. So as the number of clusters increases the avrage throughput also increases as in Fig 2.

Speed variations with the throughput also analyzed and it is plotted as in Fig 3. The throughput is changes with the vehicular speed.

Prioritization of vehicles is done by using the proposed MAC scheme. This is done by calculating the deviations of velocities and this deviation of velocity is proportional to the channel access priority. As the deviation is high the priority level is high and low priority level is for the lower deviation vehicles. The velocity of vehicles in same track is taken as same for simplifying the simulation. The performance analysis is done in this case by using the parameters throughput and packet delivery ratio. Both the packet delivery ratio and the throughput increase when the velocity of vehicle increases and it is given in Fig 4 and Fig 5.

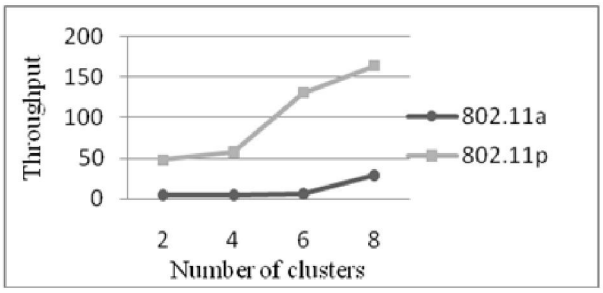

Fig. 2. Number of clusters v/s throughput

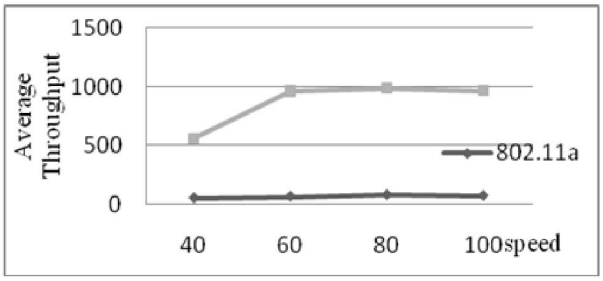

Fig. 3. Speed variation v/s Throughput

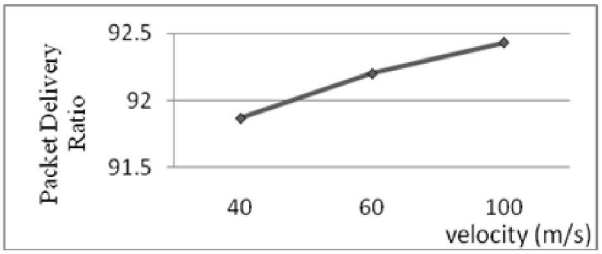

Fig. 4. Velocity v/s Packet delivery ratio

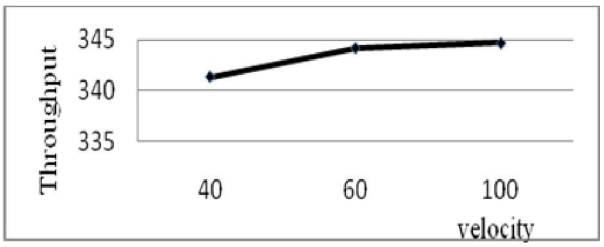

Fig. 5. Velocity v/s Throughput

4 CONCLUSION

In vehicular ad hoc network dynamic clustering is an important challenge because in some previous works gateways in this type of networks are considered static which is not suitable for dynamic nature of such networks. Dynamic clustering can easily did by using zone based approach. This is similar to normal clustering but all of the members can act as cluster head and clusters can overlap each other. This is done by considering the dwelling time of vehicles. In the prioritization scheme a new MAC scheme is developed in which deviation of vehicles are considered. Dwelling time is inversely proportional to the deviation of vehicles. When the deviation increases the level of channel access priority also increases. When the prioritization is introduced there is 0.2% increment in Packet Delivery Ratio is occurred. The deviation of vehicular velocity is used to calculate the level of priority. As the deviation increases the level of priority also increases.

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Water Quality of Hot Water Unkeshwar Spring of Maharashtra, India

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ABSTRACT: Physical, chemical, ionic, biological studies were conducted at hot springs Unkeshwar in (Maharashtra State, India). It is positioned on south east corner of Maharashtra. Unkeshwar is situated on the bank of river Penganga. *Objective*: This papers aims to study the physical, chemical and biological properties in the ecological system of Unkeshwar spring. *Methods*: The physical and chemical parameters were analyzed as per APHA. *Results*: The physical parameters included: Temperature, Total solids, Total dissolved solids, Total suspended solids and electrical conductivity. The chemical parameters included: pH, free carbon-dioxide, total hardness, calcium hardness, magnesium hardness, Phenolphthalein alkalinity, total alkalinity, Salinity. Ionic parameters like chloride, phosphate, sulphate, calcium, magnesium, sodium, potassium, iron, chromium and manganese. Also the biological parameters studied standard plate count and most probable number. *Conclusions*: The water quality comparison of Unkeshwar spring in Nanded reveals that although the situation is not worst but it has to be maintained. Some of the water characteristics are below the permissible limit in the post-monsoon season and some are above the permissible limits in pre-monsoon season. This may be due to dilution of water by raining. Overall study showed that the water is more polluted in pre-monsoon as compared to post-monsoon. Hence this hot water spring should be preserved for its sulphur contents that possess medicinal value and cure skin diseases.

KEYWORDS: Thermal Springs, Physico-Chemical Parameters, Permissible Limit, Microbiological and chemical standards, drinking water, Unkeshwar.

1 INTRODUCTION

Water is the world's most precious resource because the life of animals and plants depends on it. Most industries also require water for various applications, so the global economy depends on it as well. Springs are the places where ground water is discharged at specific locations on the earth and they vary dramatically as to the type of water they discharge. Many of the springs are the result of long cracks or joints in sedimentary rock [1]. Hot springs are defined as springs where the temperature of water lies significantly above the mean of annual air temperature of that region [1, 2]. Hot ground water can be used to drive turbines and generate electricity, or it can be used directly to heat homes and other buildings. Energy extracted from the Earth's heat is called geothermal energy [3]. An aquifer refers to an underground source of water. The water can be present within cracks and crevasses of rock, sand, clay, gravel or other material and in spaces between adjacent particles of material [4].

The rate and direction of groundwater movement in an aquifer in part depend on both the gradient of the water table, or hydraulic gradient and the type of material found in the aquifer. In general, the hydraulic gradient for an unconfined aquifer is approximately the slope of the water table [5]. Water is one of the abundantly available substances in nature. It is essential constituent of all animal and plants material and forms about 75% of matter of earth crust. It has been argued previously that geochemical energy-yields may be a key determinant of microbial community structure and diversity in thermal environments [6]. Rainfall, an important and largest source of water, other sources are surface water and sub-surface water

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or ground water [7]. Water is mostly important for industrial and municipal purposes. In addition to the direct consumption of water at homes and farms, there are many indirect ways in which water affects our daily life.

The physical, chemical and biological composition of water is influenced to a great extent by different factors including climate, geomorphology and geology. Also the physical variables which include temperature and turbidity; chemical variables in that non-toxic variables such as pH, total dissolved salts, salinity, conductivity, ions, nutrients, organic matter and dissolved gases and toxic variables like biocides and trace metals. The objectives of the present work are to analysis and discuss the suitability of water for drinking and sanitation.

2 MATERIAL AND METHODS

2.1 STUDY AREA

Geographical location of Unkeshwar is latitude (19°34'–19°40'N and 78°22'– 78°34'E) longitude. Unkeshwar is situated on the bank of river Penganga. Unkeshwar are the hot springs which are located close to the famous temple of God Shiva. It is situated at a distance of 19 km from Ambadi, a railway station on Mudkhed – Adilabad railway route. These springs are said to possess medicinal value and cure skin diseases. The temperature of water in one tank stands at 42.2^0 C and is found to contain sulphur in water springs. The excess water flows out from the Gomukh. Near the temple is a holy tank. It was said to be the abode of the Sage Sarabhanga [38]. Many bubbles are seen in the tank which indicates sulphur contents as per the experts.

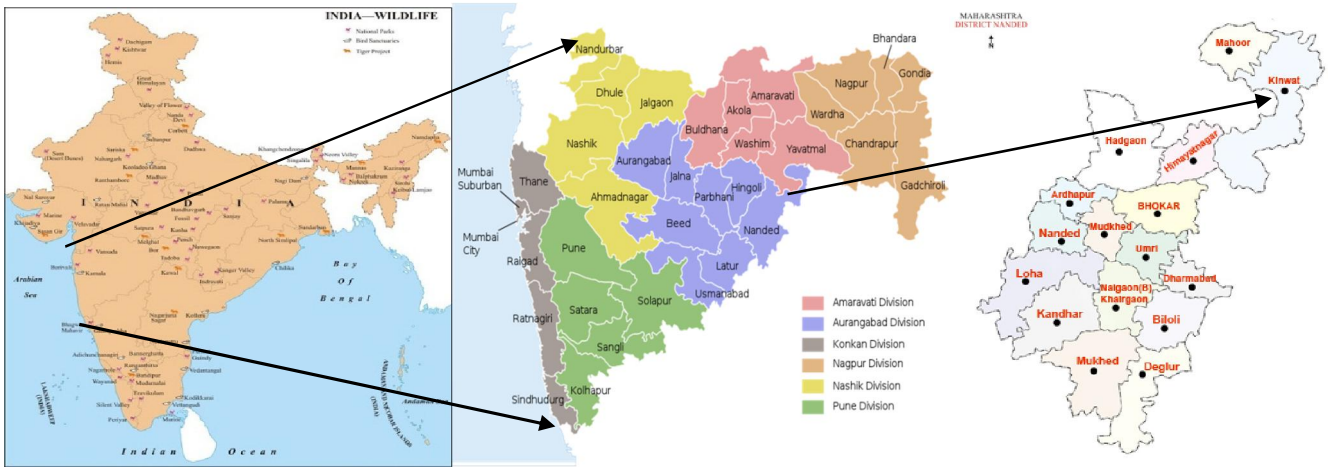

Fig. 1. Showing study areas map of district

Fig. 2. Holy tank of Unkeshwar hot spring

2.2 SAMPLING METHODS

For the present investigation the water samples collected from the Unkeshwar spring and taken in pre-cleaned polyethylene bottle. The all water quality parameters estimated by the standard methods given by APHA [8]. Water temperature recorded immediately on the site by mercury thermometer. TS, TDS and TSS of water samples measured using gravimetric method. EC values of the water sample under investigation were measured using Digital Conductivity meter. The pH value of water sample measured by using Digital pH meter. The carbon dioxide determined by titrating with NaOH using phenolphthalein as an indicator.

The salinity was generally determined by titrating the water samples against standard solution of silver nitrate using potassium chromate as an indicator. The total hardness, magnesium hardness and magnesium of the water sample were determined by complex metric titration with EDTA using Erichrome black T as an indicator. The calcium hardness and calcium of the water sample were determined by complex metric titration with EDTA using Murexide as an indicator. Phenolphthalein and Total alkalinities of the water samples were determined by titrating with H_2SO_4 using phenolphthalein and methyl orange as indicators. The fluoride is estimated by SPANDS method. The iron, chromium and manganese estimated by Thiocynate, Diphenylcarbazide and Persulphate method respectively. The SO_4^{2-} , PO_4^{2-} and NO_3^- were estimated using UV-Visible spectrophotometer. The SPC and MPN determined using Nutrient agar media and Mac -Conkey broth respectively.

3 RESULT AND DISCUSSION

3.1 TEMPERATURE

The water temperature noted from Unkeshwar spring was 42.0^{o}C in pre-monsoon and 40^{o}C in post-monsoon season with an average 41 ^{o}C; this is high as compared to other water bodies so this is a hot spring.

Jayabhaye et al. [9], reported water temperature ranged from 22.5-32.5^{0}C from Kayadhu river, near Hingoli during January-December 2004.

3.2 TOTAL SOLIDS (TS)

The mean value of total solids observed from water sample is 6324 mg/L and 474 mg/L in pre and post monsoon respectively.

Raveen et al. [10], found total solid ranged between 556-762, 542-671 and 608-667mg/L from Chitlapakkam, Selaiyur and Sembakkam Lake during January-December 2006 of Chennai respectively.

3.3 TOTAL DISSOLVED SOLIDS (TDS)

The average total dissolved solids observed from water sample are 5180 mg/L in pre-monsoon and 300 mg/L in post monsoon. Total dissolved solids are above the permissible limiting 500 mg/L recommended by WHO.

Asrari et al. [11], measured the TDS minimum 50mg/L and maximum 3575 mg/L from Kor River, Iran. The amount of TDS related with increasing dissolved ions.

3.4 TOTAL SUSPENDED SOLIDS (TSS)

The mean total suspended solids recorded from water sample are highest 1144 mg/L in pre-monsoon and lowest 174 mg/L in post-monsoon season.

Gautam et al. [12], observed TSS ranged from 8-84 and 6-38 in post and pre monsoon from surface water samples of Gulbarga respectively. Also they found TSS range below detectable limit to 42 and 6-220 from Bagalkot in same seasons.

3.5 ELECTRICAL CONDUCTIVITY (EC)

The average of Electrical conductivity recorded from water sample is 58 uS/cm and 260 uS/cm.

Akoto and Adiyiah [13], recorded EC ranged between 53 to 253 uS/cm from Yokomo stream also they recorded EC from ground water samples 873 and 1216 uS/cm during 0the year 2005 of Brong Ahafo region, Ghana.

3.6 HYDROGEN ION CONCENTRATION (pH)

The average of pH noted from water sample is 7.37 in pre-monsoon and 7.65 in post-monsoon season.

More and Nandan [14], observed high pH 7.66-7.86 and 7.58-7.66 which favored the growth of algae during his study January 1994 to December 1995 from Panzara dam and river respectively.

3.7 FREE CARBON DIOXIDE (CO_2)

The mean values of free carbon dioxide found from water sample are 8.8 mg/L in one season and below detectable limit in another season.

Shaikh and Yeragi [15], observed free carbon dioxide ranged between 2.20-5.28, 1.32-5.28 and 1.54-3.08 mg/L in summer, monsoon and winter from Tansa River, Thane, and Maharashtra during December 1999-November 2001 respectively. This high free CO_2 may due to dissolution from atmosphere, decomposition of organic matter and respiration of aquatic plants.

3.8 SALINITY

The obtained salinity of water sample is 141 mg/L and 128.8 mg/L with an average 134.5 mg/L.

Tripathi et al. [16], found salinity values minimum 655-1370 mg/L and 350.4- 705 from Suvaw nala and Rapti river near Balrampur, Uttar Pradesh, India respectively.

3.9 TOTAL HARDNESS

The average total hardness obtained from water sample is 200 mg/L and 120 mg/L with the mean value of 160 mg/L.

Singh et al. [17], found hardness level as 243 mg/L, 180 mg/L and 149 mg/L during June 1999 from the wells, springs and the rivers respectively in Udhampur, Jammu and Kashmir. Also they found hardness 194 mg/L, 179 mg/L and 146 mg/L in October 1999 from same water sampling sites.

3.10 CALCIUM HARDNESS

The value of calcium hardness observed from water samples are 150 mg/L and 50 mg/L in pre and post-monsoon respectively. The mean calcium hardness was 100 mg/L.

Balakrishnan and Karuppusamy [18], obtained calcium hardness varied from 115.5, 294.0, 390.6 and 398.7 mg/L in S1, S2, S3 and S4 respectively from the selected sites of drinking water. The higher hardness due to Ca and Mg imparts unpleasant odour to water.

3.11 MAGNESIUM HARDNESS

The estimated magnesium hardness of water samples are 50 mg/L and 70 mg/L with an average is 60 mg/L.

Prajapati and Mathur [19], obtained magnesium hardness varied from 2-133 mg/L from rural ground water samples of Sheopurkalan, Madhya Pradesh. During 1998-99. Only two samples exceeded the standard limit i.e. 100 mg/L permitted by ISI standards.

3.12 PHENOLPHTHALEIN ALKALINITY (PA)

The phenolphthalein alkalinity for water sample is below detectable limit in pre-monsoon and 30 mg/L in post-monsoon season.

Gupta and Shukla [20], observed Phenolphthalein Alkalinity 0- 5mg/L in groundwater and canal water showed 0-15mg/L from Auriya district (UP) during January-December 2002.

3.13 TOTAL ALKALINITY (TA)

The observed total alkalinity of water samples are 300 mg/L and 430 mg/L in pre and post-monsoon season respectively. The mean total alkalinity 365 mg/L is above the permissible limit.

Sawant and Telave [21], found total alkalinity 118-264, 197-321,293-499 and 85-120mg/L from Mumewadi, Gijwane, Nool and Mahagaon during different seasons of the period 2006-2007 at Gadhinglaj Tehsil, Maharashtra.

3.14 CHLORIDES (CL)

The estimated chloride of water sample in pre-monsoon is 78.1 mg/L and in post-monsoon is 71 mg/L. The mean value of chloride is 74.5 mg/L.

Rajalakshami and Sreelatha [22], observed the chloride content, which was found within a range of 14.25 to 86.25 mg/L and 16.84 to 92.46 mg/L at station A and B during July 2004 to June 2005 respectively. High chloride content due to organic wastes of animal origin and of industrial effluents.

3.15 PHOSPHATE (PO_4)

The phosphate concentration investigated from water samples are 0.107 mg/L and 0.2 mg/L in pre-monsoon and post-monsoon respectively. Average phosphate content is 0.15 mg/L.

Singh [23], observed high concentration of PO_4 in Damodar river at some selected sites which indicates anthropogenic inputs because naturally PO_4 concentration should not exceed 0.05 mg/L. Its concentration restricted by low solubility of PO_4 bearing minerals in water. He found PO_4 in the range of 0.01 - 1.70 in surface water.

3.16 SULPHATE (SO_4)

The average sulphate concentration investigated from water sample is 92.1 mg/L. The sulphate content 144.34 mg/L observed in pre-monsoon and 40 mg/L in post-monsoon season.

Fadtare and Mane [24], studied water pollution of Mula, Mutha and Pavana River in Pune. They found concentration of sulphate ranged from 36 – 348 mg/L due to leaching of gypsum and minerals.

3.17 CALCIUM (CA)

The mean calcium content observed from water sample is 40.08 mg/L. The calcium concentration 60.12 mg/L in pre-monsoon and 20.04 in post-monsoon observed from spring.

Vijayakumara et al. [25], observed calcium ranged from 8.60 – 94.10 mg/L 75.25 – 124 mg/L in surface and sub-surface water of Bhadra River respectively.

3.18 MAGNESIUM (MG)

The average magnesium content noted from water sample is 14.62 mg/L. The 12.2 mg/L of magnesium found in pre-monsoon and 17.05 mg/L in post monsoon.

Jawale and Patil [26], analyzed Mangrul dam water, Jalgaon during November 2006-October 2007. In that they observed magnesium maximum 30.19 mg/L in December and minimum 6.33 mg/L in October. Also found at site I maximum 27.27 mg/L in December and lowest 7.3mg/l in June at site II.

3.19 SODIUM (NA)

The average sodium content obtained from water sample is 89.05 mg/L. The observed sodium content are130.6 mg/L and 47.5 mg/L in pre and post-monsoon respectively.

Tepe et al. [27], recorded maximum sodium level of 44 mg/L in January from both stations in the period of April 2003 to April 2004 from Yarseli Lake. The average sodium concentrations were 37 and 38 mg/L for Station 1 and Station 2, respectively.

3.20 POTASSIUM (K)

The average potassium content detected from water sample is 22.3 mg/L. The potassium measured from water samples are 40.8 mg/L and 3.9 mg/L.

The slight seasonal variations in the potassium of the ponds indicate that the conservative nature of Potassium. Abdo [28], found ranges of K^+ to be from 13.61 – 15.31, 13.28 – 16.11, 12.87 – 14.76 and 13.28 – 15.50 mg/L during winter, spring, summer and autumn in the year 2003 respectively from Abu Za'baal ponds.

3.21 FLUORIDE (F)

The mean fluoride level analyzed from water sample is 0.89 mg/L.

Rao et al. [29], obtained fluoride content ranged from 0.102-0.894, 0.254-0.83 and 0.115-1.61 mg/L from western, Eastern zone and BED village drinking water ponds of Kolleru lake region respectively.

3.22 IRON (FE)

The average iron obtained from water sample is 0.043 mg/L. The iron metal content 0.086 mg/L in pre-monsoon and below detectable limit in post-monsoon season.

Sheeja et al. [30], observed iron metal 0.71 to 1.88mg/L and manganese was nil in Thampraparani River (West) during its flow in Kanyakumari district on a single day on 6th August 2007.

3.23 CHROMIUM (CR)

The chromium analysed from water samples are 0.008 mg/L in pre-monsoon and below detectable limit in post monsoon.

Tiwary et al. [31], detected chromium concentration ranged between 0.002 mg/L to 0.013 mg/L in summer season of the year March 2000 to February 2001 .For their study they selected different sites from Ganga river at Bihar region.

3.24 MANGANESE (MN)

The manganese metal not detected in water samples.

Siddaramu et al. [32], detected manganese ranged from below detectable limit to 0.20 mg/L and below detectable limit to 0.150 mg/L in post and pre monsoon from Tungabhadra River, Karnataka during the year 2006 respectively.

3.25 STANDARD PLATE COUNT (SPC)

The mean standard plate count from water sample is 235098.8 SPC/ml. 7637.5 SPC/ml and 462560 SPC/ml.

Toroglu1 and Toroglu [33] observed large numbers of bacteria that ranged between $13x10^2$ to $20x10^3$ cfu /ml in all the waters of sampling stations of Golbasi Lake in Adiyaman, Turkey.

3.26 MOST PROBABLE NUMBER (MPN)

The MPN found from water samples are 25 MPN/100ml and 2 MPN/100ml.The water sample having MPN above the permissible limit 10 MPN/100mL which is not suitable for drinking purpose.

Alam et al. [34], found mean values (dry-24.6 MPN/100 ml, monsoon-22.5 MPN/100 ml) as shown in Table 1 are clearly unacceptable as far as drinking purposes are concerned from Surma River, China Samples were collected from September 2001 to July 2003.

The thermophiles survive at relatively high temperatures and are classified as obligate and facultative. Obligate thermophiles (or extreme thermophiles) require such high temperatures for growth, whereas facultative thermophiles (moderate thermophiles) can thrive at high temperatures but also at lower temperatures. This study was done by Sen et al., [35] on hot water spring of Orissa state, India. Similar results are also found on Unkeshwar study area by Pathak and Rekadwad [36]. Unkeshwar area falls under tropical deciduous forest. Vegetation in this area is mainly represented by

Tectona grandis [37]. The microbial diversity of these unique ecosystems was studied and this approach enabled identification of the thermophilic and sulfur bacteria.

4 TABLES AND FIGURES

4.1 TABLES

Table 1. Table of Water quality parameters of Unkeshwar spring

Sr. No.	Water Parameters	Methods	Unkeshwar Stream Pre Mansoon	Unkeshwar Stream Post Mansoon	Permissible limit by WHO (1993)	Mean ± S.D.
Physical parameters						
1	Temperature	Thermometer	42.0° C	40. 0° C	---	41±1.41
2	Total Solids	Evaporation method	6324	474	---	3399 ±4136.5
3	Total Dissolved Solids	Evaporation method	5180	300	500	2740±3450.6
4	Total Suspended Solids	Evaporation method	1144	174	---	659±685.8
5	Electrical conductivity	Conductometry	58 uS/cm	260 uS/cm	250 uS/cm	159±142.8
Chemical parameters						
6	pH	pH Meter	7.37	7.65	6.5-8.5	7.51±0.19
7	Carbon Dioxide	Titrometry	8.8	0.0		4.4±6.2
8	Total Hardness	EDTA method	200	120	150-500	160±56.5
9	Calcium Hardness	EDTA method	150	50	---	100±70.7
10	Magnesium Hardness	EDTA method	50	70	---	60±14.1
11	Phenolphthalein Alkalinity	Acid Titration	Nil	30	---	15±21.2
12	Total Alkalinity	Acid Titration	300	430	200	365±91.9
13	Salinity	Titrometry	141	128.18	---	134.59±9.06
Ionic parameters						
14	Chloride	Argentometric	78.1	71	250	74.55±5.02
15	Phosphate	Stannous chloride	0.107	0.2	---	0.1535±0.06
16	Sulphate	Turbidometry	144.34	40	500	92.17±73.7
17	Calcium	EDTA method	60.12	20.04	75	40.08±28.3
18	Magnesium	EDTA method	12.2	17.05	30	14.625±3.42
19	Sodium	Flame photometry	130.6	47.5	200	89.05±58.76
20	Potassium	Flame photometry	40.8	3.9	----	22.35±26.09
21	Fluoride	SPANDS method	0.89	0.175	0.6-1.5	0.5325±0.50
22	Iron	Thiocynate method	0.086	Nil	0.3	0.043±0.060
23	Chromium	Diphenylcarbazide method	0.008	Nil	0.05	0.004±0.0056
24	Manganese	Persulphate method	Nil	Nil	0.1	0
Biological parameters						
25	Standard plate count	Plate dilution method	7637.5 SPC/ml	462560	---	235098.8 ±321678.8
26	Most probable number	Tube dilution method	25MPN/100ml	2MPN/100ml	10	13.5±16.26

Except Electrical conductivity, P^H, SPC and MPN all the parameters are expressed as mg/Lit.

4.2 FIGURES

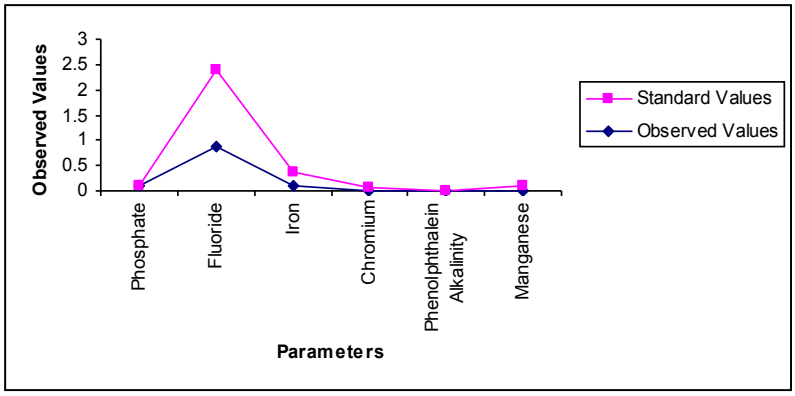

Fig. 3. Comparison of Phosphate, Fluoride, Iron, Chromium, P Alkalinity and Manganese with their standard values

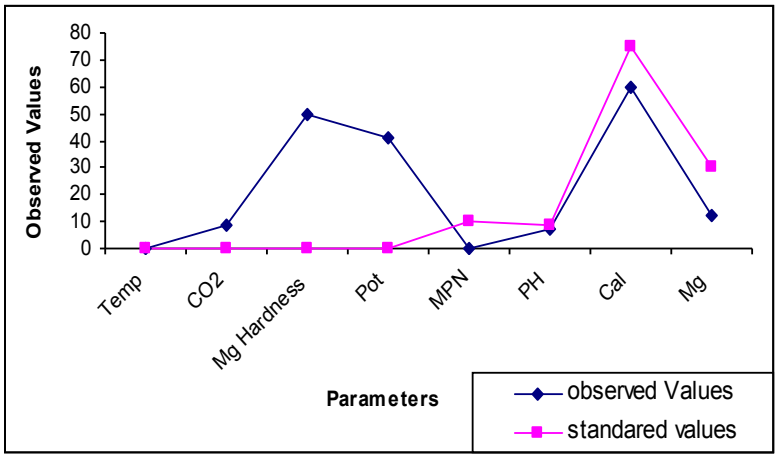

Fig. 4. Comparison of temp, CO2, Mg hardness, potassium, MPN, PH, Calcium and Magnesium with their standard values

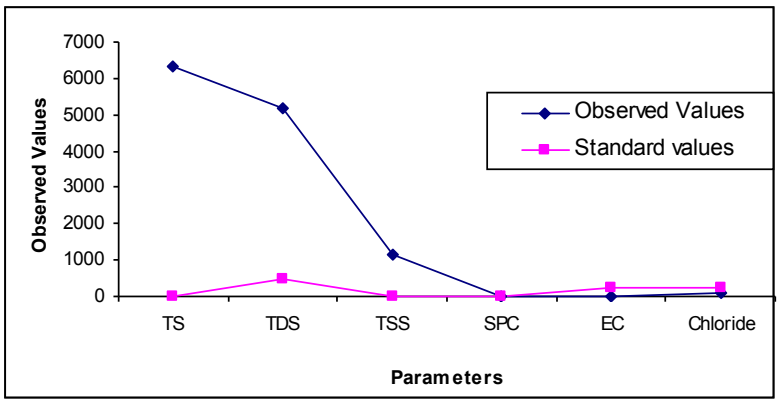

Fig. 5. Comparison of TS, TDS, TSS, standard plate count, electrical conductivity and chloride with their standard values

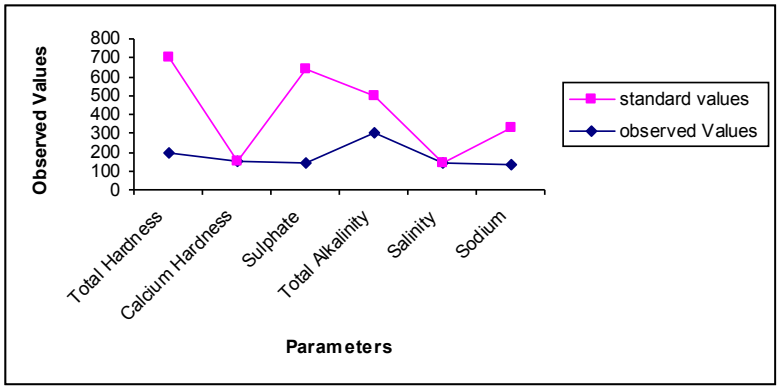

Fig. 6. Comparison of total hardness, Cal hardness, sulphate, total alkalinity, salinity and sodium with their standard values

5 CONCLUSION

On the basis of above discussion it is concluded that the water quality comparison of Unkeshwar spring in Nanded reveals that although the situation is not worst but it has to be maintained. Some of the water characteristics are below the permissible limit in the post-monsoon season and some are above the permissible limits in pre-monsoon season. This may be due to dilution of water by raining. Overall study showed that the water is more polluted in pre-monsoon as compared to post-monsoon. The archaeal and bacterial communities in three hot water samples were investigated within the context of geochemical signatures of their greater geothermal regions. In order to find common ground and to use knowledge to change perceptions and behavior, people and scientists need to work together.

6 RECOMMENDATIONS FOR IMPLEMENTATION

The following general recommendations are nevertheless made to guide decisions, based on the findings of this study.

1. Prevent pollution rather than treating symptoms of pollution.
2. Use the precautionary principle.
3. Apply realistic standards and regulations.
4. Apply water pollution control at the lowest appropriate level.

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Les intoxications aiguës aux pesticides dans la région de Tadla-Azilal (Maroc): Evolution et facteurs de risque

[Acute pesticide poisoning in Tadla-Azilal region in Morocco: Evolution and risk factors]

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ABSTRACT: The aim of this study was to determine the epidemiological profile and evaluate risk factors of acute pesticide poisoning. A retrospective study of poisoning cases, declared between January 2000 and December 2008 in different sanitary structure in Tadla-Azilal, then brought together in the Moroccan Poison Control Center, was conducted. This region is characterized by an important agricultural activity and knows a frequency of poisoning raised by this toxin. During the study period, 1027 acute pesticides poisoning cases were collected. Most resulted from the province of Beni-Mellal. The average age was of patients 27.15±18.13 years. The sex-ratio (female/male) was 1.09. The suicide and the suicide attempts had presented 55.9% of the registered cases. The teenagers and the adults were the most concerned by this type of poisonings, with, respectively, 255 cases (24.8%) and 579 cases (56.4%). During the period of the study, the lethality was 3.79%. The analysis of the relative risks with regard to the prognosis for survival shows that the age, circumstances and product in cause are the main factors of death. Acute pesticide poisoning is a serious public health problem in Morocco, particularly in the region of Tadla-Azilal. Population, both rural and urban areas that, and healthcare professionals should be aware of the potential danger of pesticides to prevent diseases caused due to absorption.

KEYWORDS: Intoxication, Organophosphorus, Epidemiology, vital prognosis, retrospective study.

RESUME: Dans le but de décrire le profil épidémiologique et de déterminer les facteurs de risque des intoxications aigues aux pesticides, nous rapportons les résultats de l'étude rétrospective des cas d'intoxications déclarés entre le mois de janvier 2000 et le mois de décembre 2008, dans la région de Tadla-Azilal - connue à forte morbi-mortalité vis-à-vis du dit toxique, au Maroc -, colligés auprès du Centre Anti Poison du Maroc. Au total, 1027 cas d'intoxication ont été déclarés au niveau de la région d'étude, la plupart provenait de la province de Béni-Mellal. L'âge moyen était de 27,15±18,13 ans. Le sex-ratio (F/M) était de 1,09. Le suicide et les tentatives de suicide avaient présenté 55,9% des cas enregistrés. Les adolescents et les adultes

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étaient les plus concernés par ce type d'intoxications, avec respectivement, 255 cas (24,8%) et 579 cas (56,4%). Durant la période de l'étude, la létalité était de 37,97‰. A la lumière des résultats de l'analyse du risque relatif (RR) l'âge de l'intoxiqué, les circonstances de l'intoxication et le produit toxique en cause présentent une association significative avec le décès. Les intoxications aiguës par les pesticides constituent un sérieux problème de santé publique au Maroc, en l'occurrence dans la région de Tadla-Azilal. La population, tant qu'urbaine que rurale, et les professionnels de santé devraient prendre conscience du danger potentiel des pesticides, afin de prévenir les maladies engendrées suite à leur absorption.

MOTS-CLEFS: Empoisonnement, Organophosphorés, Epidémiologie, Pronostic vital, Etude rétrospective.

1 INTRODUCTION

Selon le rapport de l'Organisation Mondiale de la Santé, le nombre annuel d'intoxications par les pesticides est estimé entre 1 et 5 millions, dont plusieurs milliers de cas mortels [1]. Au Maroc, bien que peu d'études aient mis l'accent sur la place des pesticides dans la pathologie toxique, certaines d'entre elles ont montré qu'ils constituent une cause d'intoxication loin d'être négligeable. Selon les données du Centre Anti Poison et de Pharmacovigilance du Maroc (CAPM), les intoxications aigues aux pesticides (IAP) occupent la 4ème position après les médicaments, les produits industriels et les aliments et, leur taux brut d'incidence au niveau national était de 2,3 pour 100 000 habitants en 2007 et 2,56 pour 100 000 habitants en 2008 [2]. Selon le CAPM, les létalités les plus élevées par les IAP étaient enregistrées dans la région de Tadla-Azilal (9%) suivie de la région de Doukala-Abda (5,5%) [2]. L'objectif principal de cette étude est de décrire les aspects épidémiologiques, cliniques et évolutifs des intoxications aiguës par les pesticides au niveau de la région de Tadla-Azilal et évaluer les facteurs prédictifs de gravité de ce type d'intoxication, afin de promouvoir des actions pour leur prise en charge médicale et leur prévention.

2 DONNEES ET METHODES

2.1 REGION DE L'ETUDE

La région de Tadla-Azilal est située géographiquement dans le centre-ouest du Maroc. Sa superficie est de 16 996 km2 ; elle représente 3,2 % du territoire national et sa population est estimée à 1 479 000 habitants en 2004, soit 4,85 % de la population du Maroc [3]. Sur le plan administratif, elle est découpée en deux provinces : Beni Mellal et Azilal (Figure 1).

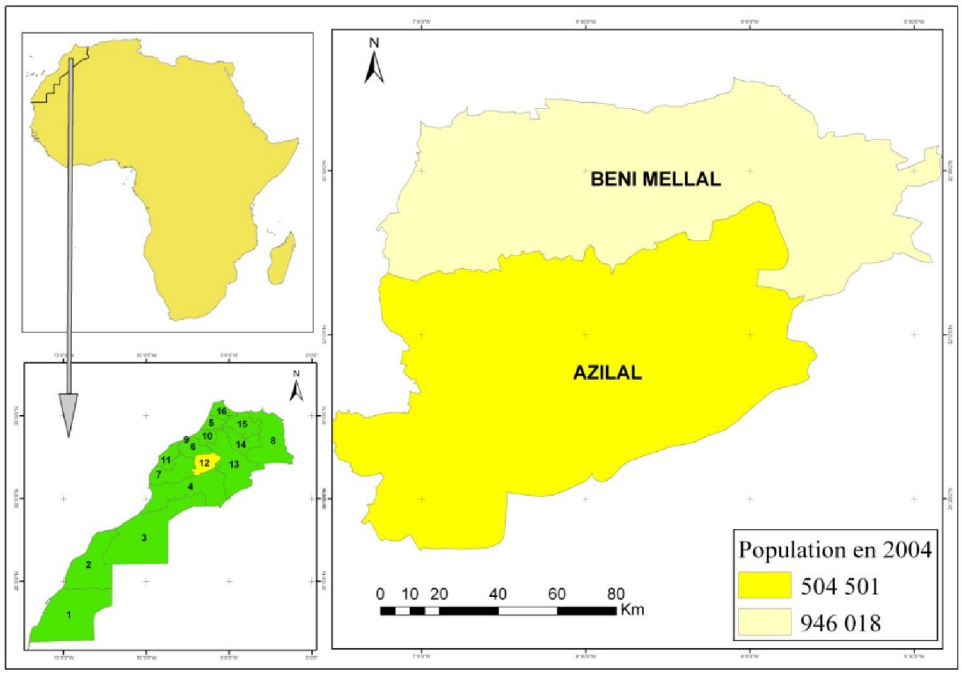

Fig. 1. Position géographique de la région de Tadla-Azilal au Maroc

2.2 SOURCES D'INFORMATION

Les supports de données utilisés dans cette étude sont les fiches de Toxicovigilance qui sont remplies par le médecin ou l'infirmier chargé du malade et les dossiers médicaux qui sont mis en place au service de l'Information Toxicologique au niveau du CAPM [4].

2.3 PARAMETRES ETUDIES

Les caractères étudiés concernent les caractéristiques du patient intoxiqué (l'âge et le sexe) ; pour les tranches d'âge on a utilisé classification INTOX [5] ; et les caractéristiques de l'intoxication. Ces dernières correspondent aux paramètres spatio-temporels à savoir les années et les provinces.

L'influence de ces différents facteurs sur l'évolution de l'état de santé du patient intoxiqué sera également discutée dans ce travail. Cette évolution correspondra ici à la gradation (le degré de sévérité du cas), le score utilisé est le « Poisoning Severity Score (PSS) » [6], défini

- Grade 0 : Absence de signe fonctionnel ou physique ;
- Grade 1 : Symptômes mineurs, transitoires et régressant spontanément ;
- Grade 2 : Symptômes marqués ou persistants ;
- Grade 3 : Symptômes sévères ou engageant le pronostic vital, et ;
- Grade 4 : Intoxication mortelle.

2.4 METHODOLOGIE

Le présent travail consiste en une étude rétrospective de tous les cas d'intoxications aiguës aux pesticides déclarés, pendant la période 2000-2008, dans la région de Tadla-Azilal, colligés auprès du Centre Anti Poison du Maroc.

La méthodologie statistique utilisée s'est basée sur l'analyse de la composante principale (ACP) qui permet d'évaluer la corrélation existée entre les différentes variables étudiées.

Le test $\chi 2$ de contingence et le calcul du risque relatif nous ont permis d'étudier l'association entre les variables étudiées et l'évolution. La létalité a été également calculée afin de connaitre avec précision les gravités de la problématique au niveau de cette région.

3 RESULTATS

Durant la période d'étude, la région de Tadla-Azilal avait notifié 1 027 cas d'intoxications aiguës par les pesticides.

La figure 2 montre la distribution des cas d'intoxications et de la létalité spécifique selon les années.

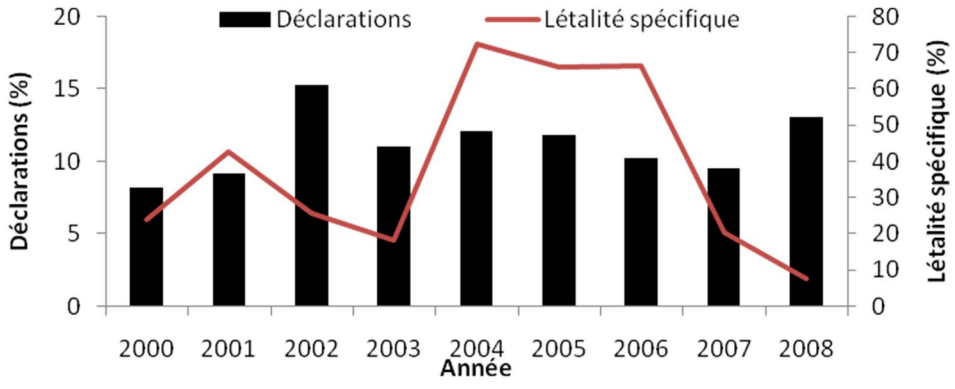

Fig. 2. Distribution des cas d'intoxication et de la létalité spécifique selon les années

Le nombre des cas d'intoxications aiguës aux pesticides avait connu une augmentation progressive, allant de 84 cas en 2000 à 134 cas en 2008. Le maximum de cas a été atteint en 2002, avec 157 cas. La létalité spécifique variait de la même façon, avec un pic enregistré en 2004 (72,5%).

Le tableau 1 montre les différentes caractéristiques liées aux intoxiqués, au toxique et à l'intoxication.

Table 1. Caractéristiques des intoxications aiguës par les pesticides dans la région de Tadla-Azilal

Variable étudiée	Nombre de cas intoxiqués	Fréquence d'intoxication (%)	Evolution			Létalité (%)
			Nombre de cas guéris	Nombre de cas décédés	Nombre de cas à évolution inconnue	
Tranches d'âge						
≤ 15 ans	0185	18,01	129	04	052	2,16
> 15 ans	0707	68,84	464	34	209	4,81
Inconnu	0135	13,15	062	01	072	0,74
Total	**1027**	**100,00**	**655**	**39**	**333**	**3,82**
Sexe						
Féminin	0537	52,29	335	22	180	4,10
Masculin	0490	47,71	320	17	153	3,47
Inconnu	-	-	-	-	-	-
Total	**1027**	**100,00**	**655**	**39**	**333**	**3,83**
Milieu						
Urbain	0259	25,23	165	06	088	2,32
Rural	0450	43,81	278	22	150	4,89
Inconnu	0318	30,96	212	11	095	3,46
Total	**1027**	**100,00**	**655**	**39**	**333**	**3,80**
Province						
Béni Mellal	1015	98,83	648	38	329	3,74
Azilal	0012	01,17	007	01	004	8,33
Inconnu	-	-	-	-	-	-
total	**1027**	**100,00**	**655**	**39**	**333**	**3,80**
Produit en cause						
Insecticides	0844	82,18	565	37	242	4,38
Raticides	0045	04,38	025	01	019	2,22
Herbicides	0004	00,39	003	-	001	-
Inconnu	0134	13,05	062	01	071	0,74
Total	**1027**	**100,00**	**655**	**39**	**333**	**3,80**
Circonstance						
Accidentelles	0444	43,24	334	08	102	1,80
Volontaires	0580	56,47	321	31	228	5,34
Inconnu	0003	00,29	-	-	003	-
total	**1027**	**100,00**	**655**	**39**	**333**	**3,80**
Grade						
Grade 0(Néant)	0009	00,88	007	-	002	-
Grade 1(Mineur)	0013	01,26	010	-	003	-
Grade 2(Modéré)	0879	85,60	604	-	275	-
Grade 3(Sévère)	0054	05,26	026	-	028	-
Grade 4(Fatal)	0039	03,79	-	39	-	**100,00**
Inconnu	0033	03,21	008	-	025	-
Total	**1027**	**100,00**	**655**	**39**	**333**	**3,80**
N.B : sur les 994 cas d'intoxication pour lesquels l'évolution est connue, 3,92% des cas avaient négativement évolué.						

D'après les résultats consignés dans le tableau 1, les intoxications aigues aux pesticides avaient concerné essentiellement les personnes dont l'âge est supérieur à 15 ans (68,84% des cas), avec une létalité spécifique de 4,81%. L'âge moyen des cas intoxiqués était de 27,15±18,13 ans.

Les deux sexes sont touchés de la même façon (avec un $\chi 2 = 2,15$; $p>0,01$), mais la létalité la plus importante a été marquée chez le sexe féminin (4,10%). Les cas intoxiqués d'origine rurale avaient représenté 43,81% de l'ensemble des cas, avec une létalité spécifique de 4,89%. La répartition géographique montre que les deux provinces ont été touchées, cependant, le maximum de déclarations a été enregistré dans la province de Béni Mellal (98,81% des cas) et la létalité la plus élevée a été observée au niveau de la province d'Azilal. Selon la classe chimique des pesticides, les insecticides organophosphorés étaient responsables de 82,18% des cas d'intoxication avec une létalité spécifique de 4,38%. Pour ce qui est des circonstances d'intoxication, le suicide et les tentatives de suicide avaient représenté 56,47% de l'ensemble des cas enregistrés, avec une létalité spécifique de 5,34%, contre 43,24% des cas survenus accidentellement. La gravité de l'intoxication aiguë par les pesticides était majoritairement modérée (grade 2) (85,61%). Parmi les 994 patients pour lesquels l'évolution est connue, 39 avaient décédés, soit une létalité de 3,8%.

Afin de déceler l'influence des paramètres étudiés pour le pronostic vital des intoxications, nous avons procédé à une analyse de composantes principales dont les résultats sont schématisés sur la figure 3 et le tableau 2.

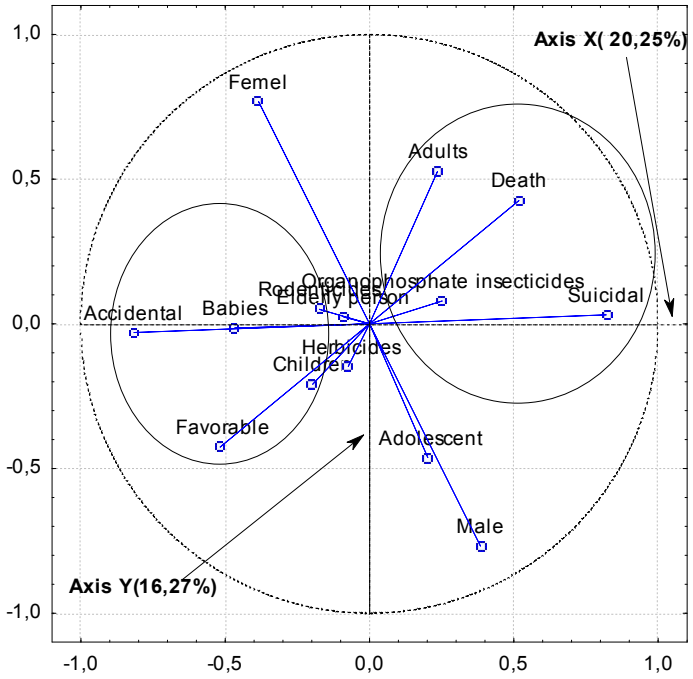

Fig. 3. Projection des groupes d'âge, du sexe, des circonstances, des classes des pesticides et de l'évolution sur le plan factoriel

Table 2. Corrélation des poids des facteurs sur les variables

Variable étudiée	Facteur 1	Facteur 2
Age		
Bébé marcheur	-0,47	-0,01
Enfant	-0,20	-0,21
Adolescent	0,20	-0,46
Adulte	0,24	0,53
Personne âgée	-0,09	0,02
Sexe		
Féminin	-0,39	0,77
Masculin	0,39	-0,77
Produit en cause		
Insecticides organophosphorés	0,26	0,08
Raticides	-0,18	0,05
Herbicides	-0,07	-0,15
Circonstance		
Accidentelle	-0,82	-0,03
Suicidaire	0,82	0,03
Evolution		
Favorable	-0,52	-0,43
Défavorable	0,52	0,43

L'analyse de composantes principales ACP (Figure 3), montre que les deux premiers axes contribuent par 36,52 % dans la variation totale des groupes d'âge, du sexe, des circonstances et des classes des pesticides en fonction de l'évolution.

Selon le premier axe qui représente 20,25% de la variabilité, on note une association entre les adultes, les circonstances suicidaires, les insecticides organophosphorés et le décès du coté (X+). Du côté opposé, on remarque que les bébés marcheurs sont liés aux circonstances accidentelles (X-). Suivant le deuxième axe (16,27%), on trouve une liaison entre les circonstances accidentelles, la classe des herbicides et l'évolution favorable des enfants du coté (Y-). Ces résultats révèlent, en conséquence, une affinité importante entre les adultes, les circonstances suicidaires et l'évolution vers le décès d'une part, et entre les circonstances accidentelles et l'évolution favorable des bébés marcheurs et des enfants.

Afin de mettre en évidence les facteurs de risque des intoxications aiguës par les pesticides, nous avons étudié l'effet du sexe, l'âge, l'origine, les circonstances, les signes cliniques et la classe chimique sur le pronostic vital des patients (Tableau 3).

Table 3. Effet des caractéristiques étudiées sur l'évolution de l'état de santé des patients

Variable	Modalité	Nombre de cas guéris	Nombre de cas décédés	$\chi 2$	P	RR	IC95%
Sexe	Masculin	320	17	0,40	0,52	1,23	0,65-2,37
	Féminin	334	22				
Age	Bébé	067	02	1,08	0,29	0,47	0,11-2,00
	Enfant	061	01	2,07	0,15	0,25	0,03-1,89
	adolescent	161	07	0,90	0,34	0,67	0,28-1,54
	adulte	360	29	5,52	0,01	2,36	1,13-4,92
Origine	Urbaine	164	06	2,85	0,09	2,17	0,86-5,48
	Rurale	278	22				
Circonstance	Volontaire	319	31	13,82	<0,001	4,06	1,84-8,96
	Accidentelle	334	08				
Produit en cause	Herbicides	139	02	2,53	0,12	1,33	0,08-1,38
	Insecticides	800	36	3,14	<0,001	2,81	1,86-5,31
	Raticides	044	01	0,32	0,55	1,56	0,07-4,20

$\chi 2$ Test khi-deux
p Signification
RR Risque relatif
IC95% Intervalle de confiance à 95%

L'âge de l'intoxiqué, les circonstances de l'intoxication et le produit toxique en cause sont des facteurs de risque qui avaient influencés significativement sur l'évolution de l'état de santé des patients intoxiqués par les pesticides. Les adultes étaient plus exposés aux intoxications malignes, avec un RR de 2,36 (IC95% : 1,13-4,92). Les cas intoxiqués d'une manière volontaire avaient 4 fois plus de risque d'évoluer vers le décès que ceux intoxiqués accidentellement (RR = 4,06 ; IC95 % : 1,84–8,96). Parmi les pesticides incriminés, les insecticides étaient des produits à risque potentiel vis-à-vis de la santé du patient, avec un RR de 2,81 (IC95% : 1,86-5,31).

4 DISCUSSION

Au cours de la période d'étude, la région de Tadla-Azilal a enregistré 1 027 cas d'intoxications aigues aux pesticides dont 39 cas de décès. Selon les résultats déclarés au CAPM, la région de Tadla-Azilal a enregistré le taux le plus élevé des intoxications aigues aux pesticides, avec 6,66 pour 100 000 habitants [7]. Cette situation confirme que les intoxications aigues aux pesticides dans la région de Tadla-Azilal sont loin d'être négligeables.

Entre 1989 et 2007 au Maroc, le CAPM a collecté 10 332 cas d'intoxication aigue aux pesticides, soit 14 % de l'ensemble des déclarations reçues pendant la même période. En France, d'après le Centre Antipoison de Lille, la part des pesticides dans les intoxications aiguës est moindre [8]. De 1992 à 1996, les pesticides étaient en cause dans 1,9 % des cas reçus par le CAP de Paris [9].

Dans notre série, les hommes et les femmes ont été touchés de la même façon, l'âge moyen des intoxiqués était de 27,15±18,13 ans avec un sex-ratio (F/H) de 1,09, $\chi 2$= 2,15 ; p=0,52). D'après les données analysées, les adultes et les adolescents sont les plus touchés, avec des fréquences respectivement de 56,4% et 24,8%, ce qui a impliqué une létalité élevée de 48,09‰. L'influence de l'âge serait probablement liée à la gravité des circonstances suicidaires chez ces deux groupes avec des doses ingérées relativement plus fortes que lors de circonstances involontaires. Ceci pourrait être aussi expliqué, selon [10], par le jeune âge de la population marocaine et la confrontation des jeunes aux difficultés de la vie et aux problèmes liés aux conflits familiaux, conjugaux, sentimentaux, échecs scolaires mais surtout le chômage.

D'autre part, 9,3% des enfants étaient touché par les intoxications aigues aux pesticides. Les circonstances accidentelles montrent bien une affinité avec cette tranche d'âge. Nos résultats concordent avec la littérature, Selon Une étude réalisée sur les intoxications aiguës chez l'enfant, les pesticides ont occupé la deuxième position des intoxications accidentelles après les produits domestiques durant la période 2001–2002 (28,50 %) [11]. Cependant une étude réalisée par [12] montre que 303 cas de tentatives de suicide par l'utilisation des pesticides a été marqué chez l'enfant au Maroc entre 1990 et 2008.

Les circonstances volontaires avaient représenté 56,78% des cas avec une létalité spécifique de 5,3%.Ce taux très élevé peut être lié essentiellement à la dose importante ingéré lorsque le patient est en état dépressif.

La classe chimique des pesticides impliqués dans les intoxications varie d'un pays à l'autre, celle des organophosphorés prédomine dans la majorité des études publiées [13], [14]. Dans notre étude, les insecticides organophosphorés étaient responsables de 95,2%. Ces résultats sont comparables à ceux de la plupart des études publiées [15], [16]. Ainsi, Au Maroc, les données épidémiologiques établies par le Centre Anti Poison du Maroc(CAPM) montrent que les pesticides organophosphorés sont responsables de 13 % d'intoxications tous toxique confondu [5]. Ceci peut être expliqué par la disponibilité et l'accès facile des produits agricoles, surtout dans les zones rurales, en l'occurrence les champs et les terres agricoles de la région.

Les organophosphorés sont des toxiques potentiellement létaux en cas d'intoxication aiguë. Ces intoxications souvent volontaires sont fréquentes, particulièrement dans les pays en développement, avec une fréquence avoisinant 3 millions d'intoxications par an dans le monde et une mortalité de l'ordre de 200 000 personnes par an [7]. Ils sont responsables de la majorité des intoxications aigues dans les pays d'Asie [17].

Les intoxiqués par insecticides organophosphorés, dans notre série de données, ont présenté des affections du système gastro-intestinal (622 cas), des affections au niveau de l'appareil respiratoire (111 cas), et des troubles au niveau du système nerveux central et périphérique (93 cas). La létalité la plus élevée était marquée chez les intoxiqués ayant des affections gastro-intestinaux (84,61%).

L'évolution clinique des intoxiqués par les pesticides a été généralement favorable, et le décès est survenue dans 39 cas, soit 3,79%. Dans la littérature la fréquence varie de 4 à 25% [18].

5 CONCLUSION

La réalisation d'une telle étude nous a permis de constater un changement de profil des intoxications par pesticides et impose d'entreprendre des actions auprès de la population, des professionnels de santé et des industries phytopharmaceutiques du Maroc. Les professionnels de santé doivent connaitre les moyens de prise en charge immédiatement dans les services de réanimation, ils doivent être familiarisés avec le tableau clinique et le danger potentiel de ce type d'intoxication. Il est primordial aussi de généraliser un système d'informations établi par le CAPM et d'instaurer un système d'audit des décès par intoxications aux pesticides.

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Level set based on new Signed Pressure Force Function for Echocardiographic image segmentation

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ABSTRACT: In the present paper a novel region based active contour method is developed by formulating a new signed pressure force (SPF) function. The method has been applied to the echocardiographic images for getting the desired boundary. The method is useful for finding the automatic boundary detection of other images (Microbiological, MRI, CT, Natural and welding joint etc.) as well. Level set method in combination with original SPF has not been able to give satisfactory results during the segmentation of echocardiographic images. There are lots of noises present in the echocardiographic images those create difficulties in the segmentation process. The proposed method resolves all these difficulties in such a manner that the output image is having the proper boundary detection without any disturbances and noises. The very important advantage of this method is that it gives a very fast response in terms of time taken by CPU and the number of iterations. Fast response is very important in the clinical area especially in diagnosis purpose. The presented model is an advancement of Selective Binary and Gaussian Filtering Regularized Level Set (SBGFRLS) method. Proposed model is more robust against images with weak edge and intensity inhomogeneity when compared with the performance of earlier methods.

KEYWORDS: Echocardiographic, Active contour, Signed pressure force function, Level set, Segmentation, Gaussian filtering, Regularized level Set.

1 INTRODUCTION

Segmentation is a well-known step which is carried out for the clinical diagnosis from medical images. But the major problem encountered during the segmentation of echcardiographic images. The literature shows that the active contour based segmentation techniques are being extensively used in medical imaging [1-5]. Active contour models can be categorized as edge based active contour models [1-4, 6, 9, 10, 11] and region based active contour models [5, 7, 8, 12-14].

Some of the edge based active contour models are used as the edge-detector. The operation of edge detector depends on the gradient of the image to stop the initial contour on the boundary of the interested objects. This technique has advantage when the objects and background of segmented image are heterogeneous. Drawbacks of these active contour models are that the satisfactory results cannot be achieved in case of objects with discrete or with the presence of blur boundaries or noise. Some active contour models as in [6] introduce the balloon force to shrink and enlarge the capture range of the force. However some undesired effects occur during balloon method. If weak balloon force is there then contour is not able to pass through the narrow part of the object, and if the balloon force is large, the contour will pass through the weak edges of the object. The geodesic active contour (GAC) [4] is the most popular methods in this category. This method uses an edge stopping function (ESF) which stops the contour on the object boundaries.

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Region based active contour models have several advantages over edge based active contour models. Region based active contour models use the statistical information inside and outside the initial curve to evolve the contour towards the boundaries of the desired object. This renders it the less sensitive to noise and gives better performance in case of weak edges. It is also suitable for regions having no edges. Another advantage is the less sensitivity about the location of the initial contour to make it, in turn, easy to detect exterior and interior boundaries efficiently. The most popular method based on the Mumford- Shah model [14], in the category of region based active contour without edges is given by Chan-Vese (C-V)[5].

There are some hybrid models that are proposed in literature to drive the advantages of both GAC and C-V models. In [15] a geodesic-aided C-V (GACV) model had been proposed which includes region and local detector in the level set flow function. In [16] a variation method has been proposed using discriminating function for color image segmentation. In [17], the region was combined with the photometric invariant edge information for color-texture image is segmentation. In [18] an integrated model is established by combining the edge location with statistical region information. Recently, in [19] signed pressure force function active contour model has been proposed. This model has the advantages of both GAC and C-V models.

In this paper, a level set method for active contour model is developed with a new signed pressure force function. Proposed model is faster than the model proposed in [19]. This model also gives the good segmentation which is represented in terms of graphical form in the paper. This model is used for Echocardiographic images in this paper but it is equally useful for other images also.

2 MATERIAL AND METHODS

2.1 GAC MODEL

In this model active contours evolve according to the measures that belong to intrinsic geometrics of the image [2, 4]. Splitting and merging takes place for the simultaneous detection both in exterior and interior boundaries. Geodesic active contour approach is based on the computation of geodesics or minimal distance curves. This allows the connection between classical snakes which are based on energy minimization and geometric active contours which are based on the theory of curve evolution. Level set formulation for GAC model is given by

$$\frac{\partial \phi}{\partial t} = g\left|\nabla \phi\right|\left(div\left(\frac{\nabla \phi}{\left|\nabla \phi\right|}\right) + \alpha \right) + \nabla g.\nabla \phi \tag{1}$$

Where ϕ is the level set function, ∇ is the gradient operator, α is real constant called the balloon force which controls the curve evolution and g is the edge based function and defined as in eq. (2)

$$g\left(\left|\nabla I\right|\right) = \frac{1}{1+\left|\nabla G_\sigma * I\right|^2} \tag{2}$$

Where, σ is the standard deviation, $G_\sigma * I$ shows the convolution between image and the Gaussian kernel.

Because GAC model is based on gradient information so it is not suitable for images with weak edges. In some cases balloon force, which is very difficult to design has been used. The other weak balloon force doesn't allow the contour to pass through narrow part of the object and in case of the large balloon force, contour will pass through the weak edges. When contour is far from the object boundary then also it is difficult to find interior or exterior boundaries of the object.

2.2 C-V MODEL

Considering the problems of edge based models, Chan-Vese [5] proposed a region based active contour model which is a special case of Mumford-Shah formulation [14]. Level set equation for C-V model is as follows:

$$\frac{\partial \phi}{\partial t} = \delta(\phi)\left[\mu\nabla\left(\frac{\nabla \phi}{\left|\nabla \phi\right|}\right) - \lambda_1\left(I(x,y)-c_1\right)^2 + \lambda_2\left(I(x,y)-c_2\right)^2 \right] \tag{3}$$

Where $I(x,y)$ is the original image and $\mu \geq 0, \lambda_1 \geq 0, \lambda_2 \geq 0$ are constants. μ is related to smoothness and λ_1 and λ_2 are the external forces to drive the contour towards the object boundaries. $\delta(\phi)$ is the Dirac delta function. c_1 and c_2 are average intensities inside and outside of the object boundaries respectively and defined as:

$$c_1 = \frac{\int_{\Omega} I(x,y).H(\phi)dxdy}{\int_{\Omega} H(\phi)dxdy} \tag{4}$$

$$c_2 = \frac{\int_{\Omega} I(x,y)(1-H(\varphi))dxdy}{\int_{\Omega} (1-H(\varphi))dxdy} \tag{5}$$

Where $H(\cdot)$ is Heaviside function and Ω is a bounded open subset of R^2.

C-V model is good boundary detection method but it takes more time to converge and gives unsatisfactory boundaries in case of echcardiographic images.

2.3 SBGFRLS MODEL

Selective Binary and Gaussian filtering regularized level set (SBGFRLS) [19] utilizes the advantages of both GAC and C-V model. In the substitution of Edge Stooping Function (ESF), a region based Singed Pressure Force function has been (SPF) developed. This SPF function controls the direction of evolution. Opposite signs (range of SPF function is [-1 1]) around the boundaries of the object in this function make the contour to able to expand when it is inside the boundary and to shrinks when it is outside the boundary.

SPF function proposed in this model is as in eq. (6):

$$spf\left(I(x,y)\right) = \frac{I(x,y) - \frac{c_1 + c_2}{2}}{\max\left(\left|I(x,y) - \frac{c_1 + c_2}{2}\right|\right)}, x, y \in \Omega \tag{6}$$

Where c_1 and c_2 are defined in eq. (4) and (5) respectively.

On the substitution of SPF function in eq. (1), the level set formulation takes the form as in eq. (7)

$$\frac{\partial \phi}{\partial t} = spf(I(x,y)).\left(div\left(\frac{\nabla \phi}{|\nabla \phi|}\right) + \alpha\right)|\nabla \phi| + \nabla spf(I(x,y)).\nabla \phi, x, y \in \Omega \tag{7}$$

The regular term $div\left(\frac{\nabla \phi}{|\nabla \phi|}\right)|\phi|$ is un-necessary because Gaussian filter can be utilized to smooth the level set function to keep the interface regular. Also the term $\nabla spf.\nabla \phi$ can be removed because the method utilizes the statistical in formation of the regions. Thus the final level set model is given as in eq. (8)

$$\frac{\partial \phi}{\partial t} = spf(I(x,y)).\alpha|\nabla \phi|, x, y \in \Omega \tag{8}$$

2.4 THE PROPOSED MODEL

The SBGFRLS model is able to overcome the problems of the GAC and the C-V model but still it is not good for echocardiographic images. It is not able to detect all boundaries. So here in the proposed model a new SPF function

$spf_n(I(x,y)$ is developed to overcome this problem. Proposed model also takes less time to converge and the lesser number of iterations to converge when compared with other models.

$$spf_n\left(I(x,y)\right) = \frac{\left(\left(c_1 * c_2\right) * \left(I(x,y) - \frac{c_1 + c_2}{2}\right)\right)}{\max\left(\left|\left(c_1 * c_2\right) * \left(I(x,y) - \frac{c_1 + c_2}{2}\right)\right|\right)}, x, y \in \Omega \quad (9)$$

Where $spf_n\left(I(x,y)\right)$ is the new SPF function as explained in the proposed method.

The significance of new SPF explained in eq. (9) can be explained by referring fig. (1), which explains that $Min(I(x,y)) \le c_1, c_2 \le Max(I(x,y))$. Hence

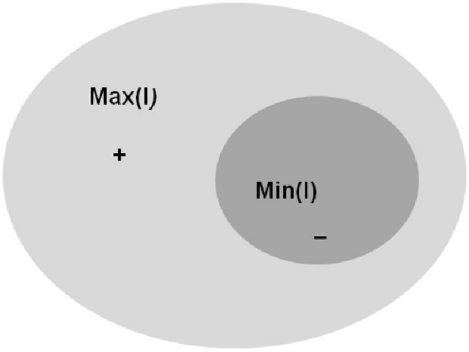

Fig. 1. Signs of SPF function inside and outside of the object

$$Min(I(x,y)) < (c_1 * c_2)\frac{c_1 + c_2}{2} < \max(I(x,y)), x, y \in \Omega \quad (10)$$

Due to identical signs of the new SPF function in eq. (9) and in fig.1 eq. (9) can be used as SPF function. So substituting the new SPF function in the eq. (1), we get the level set formulation as expressed in eq. (11)

$$\frac{\partial \phi}{\partial t} = spf_n(I(x,y)).\left(div\left(\frac{\nabla \phi}{|\nabla \phi|}\right) + \alpha\right)|\nabla \phi| + \nabla spf_n(I(x,y)).\nabla \phi, x, y \in \Omega \quad (11)$$

Similar to SBGFRLS model, the regular term $div\left(\frac{\nabla \phi}{|\nabla \phi|}\right)|\phi|$ and $\nabla spf_n.\nabla \phi$ can be removed because of the similar reasons as explained earlier. The final level set equation for the proposed method thus given in eq. (12)

$$\frac{\partial \phi}{\partial t} = spf_n(I(x,y)).\alpha|\nabla \phi|, x, y \in \Omega \quad (12)$$

2.5 STATISTICAL PARAMETERS USED FOR PERFORMANCE ANALYSIS

For getting the performance of the method statistical analysis has been done on the population of time taken per iterations. The four parameters mean, median, standard deviation and variance have been calculated.

Mean is defined as

$$\mu = \sum t / n \quad (13)$$

Where μ is the symbol for representing mean and $\sum t$ is the sum of time ken for all the iterations and n is the number of total iterations taken for the boundary detection of particular image.

Median is related to the middle value of time from time population.

The variance is the average squared deviation from the group of time mean, as defined by the following formula:

$$\sigma^2 = \sum(t_i - \mu)^2 / n \tag{14}$$

Where σ^2 is the variance, μ is the mean and t_i is the *i*th element from the time population.

The standard deviation is the square root of the variance. Thus, the standard deviation is defined as:

$$\sigma = \sqrt{\sigma^2} = \sqrt{\sum(t_i - \mu)^2 / n} \tag{15}$$

3 RESULTS

All the echocardiographic images used in the present paper for the experiment purpose are taken from Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh, India. These images are from patients who were suffering from mitral regurgitation. Parasternal long axis and apical two and four chamber view are included for diagnosing the regurgitation by analyzing the size of chambers.

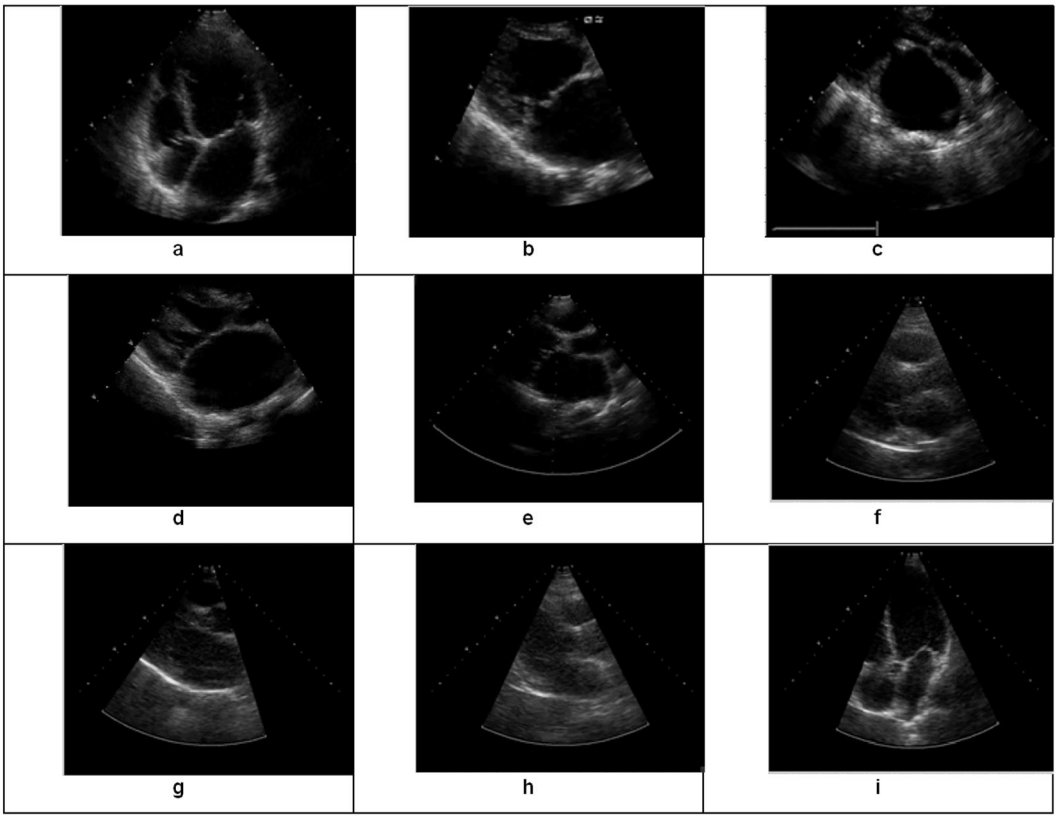

Fig. 2. Original echocardiographic Images showing the parasternal and apical view of the heart

Fig. 2. is the collection of original images associated with nine patients suffering from mitral regurgitation. Apical four views are in fig 2a and 2i.other images i.e. fig 2b, 2c, 2d, 2e, 2f, 2g and 2h are on parasternal long axis view.

Fig.3 shows the images after boundary detection with GAC model. In this figure it can be seen that from among the nine cases none gives the satisfactory boundaries. Contour leaks the required boundaries also.

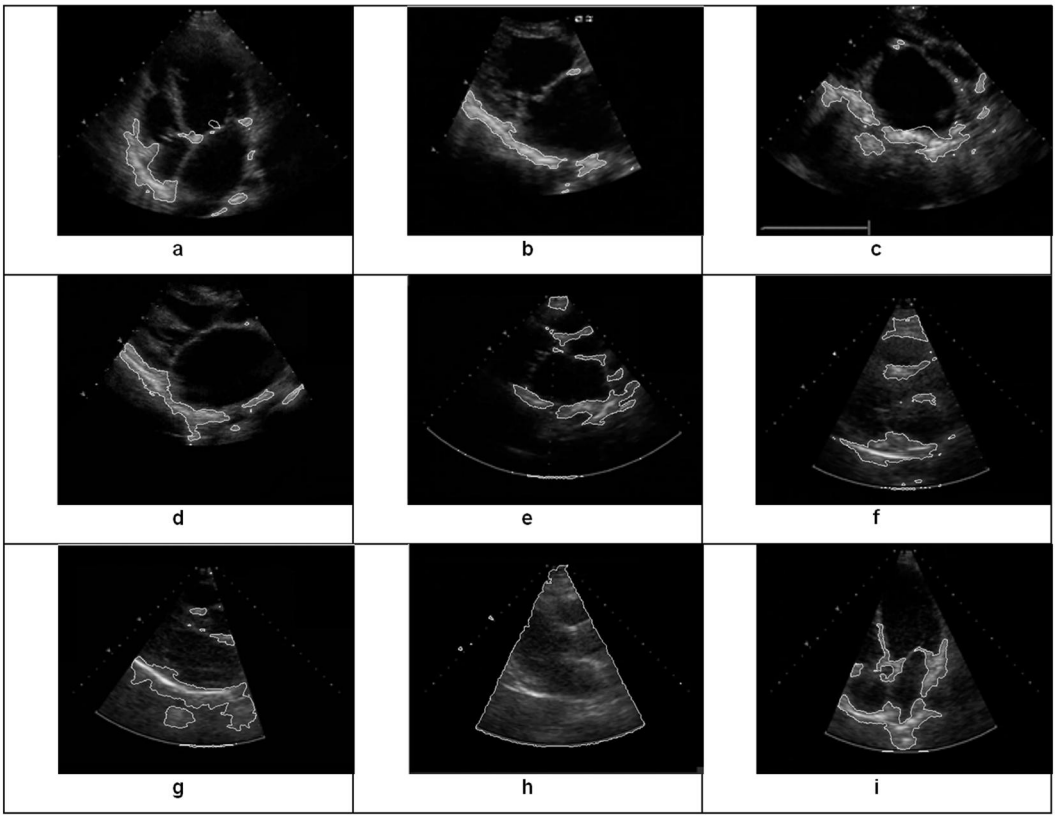

Fig. 3. Boundary detection of echocardiographic images with GAC model

Fig.4 shows the boundary detected images with C-V model. Here the results are better than the results obtained from the GAC model, However, here also the C-V model is not able to detect properly the boundaries of all the images. For example in fig 4a and fig 4i it is clearly seen that the contour is not able to detect all necessary boundaries and the similar deficiencies are also seen more or less in other images viz. fig. 4b to fig. 4h. So it is difficult to distinguish chambers properly.

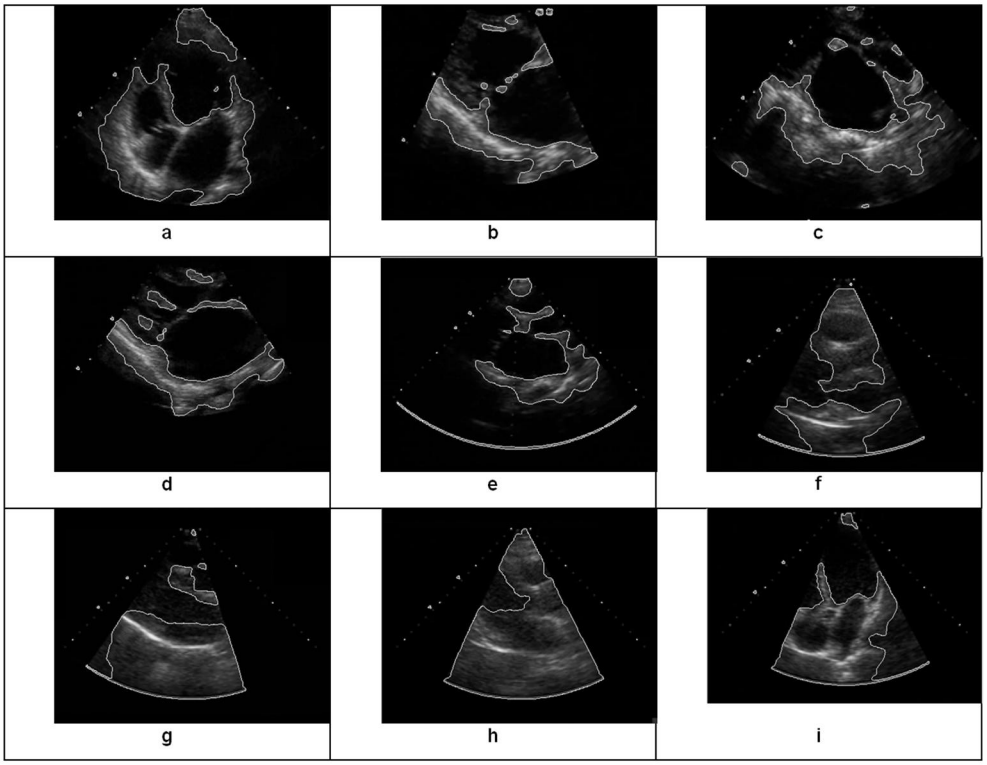

Fig. 4. Boundary detection of echocardiographic images with C-V model

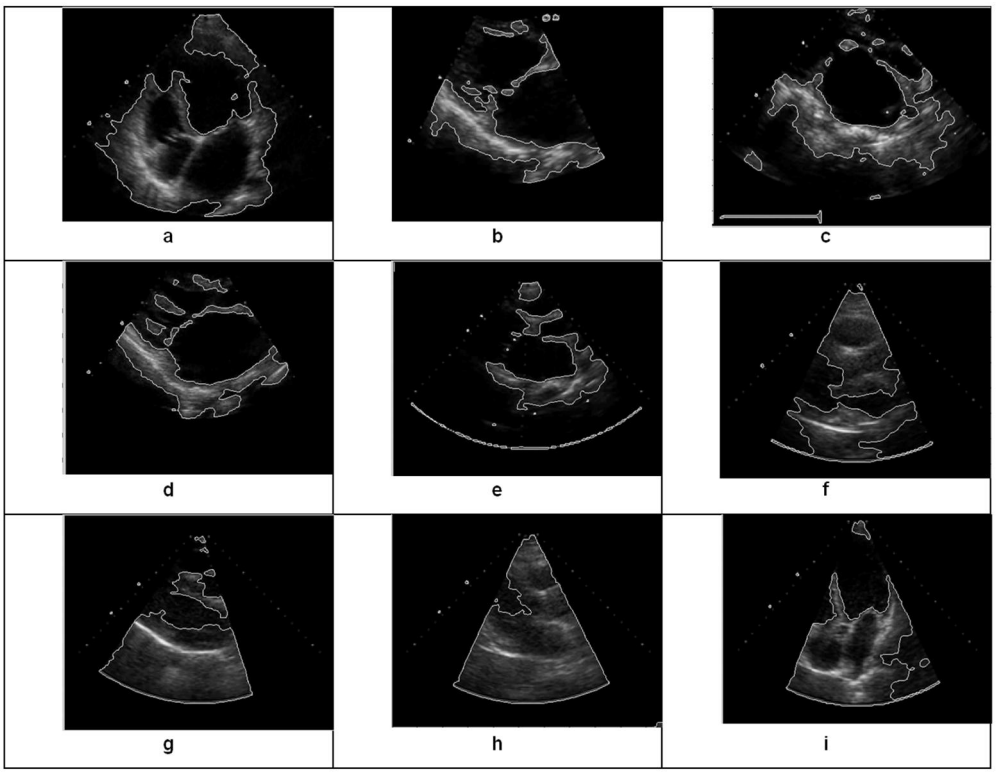

Fig. 5. Boundary detection of echocardiographic images with SBGFRLS model

Fig. 6 is the results obtained using the proposed method. It can be seen that the proposed model is able to detect all chambers boundaries. A human eye can very efficiently detect the chambers of the heart from fig. 6a through 6i. The

proposed method has been able to detect the proper boundaries in those images also in which when processed through C-V and SBGFRLS models could not be detected. Such images are for example of (i) fig. 5a and 6a, (ii) fig. 5f and 6f, (iii) fig. 5h and 6h and for (iv) fig. 5i and 6i.

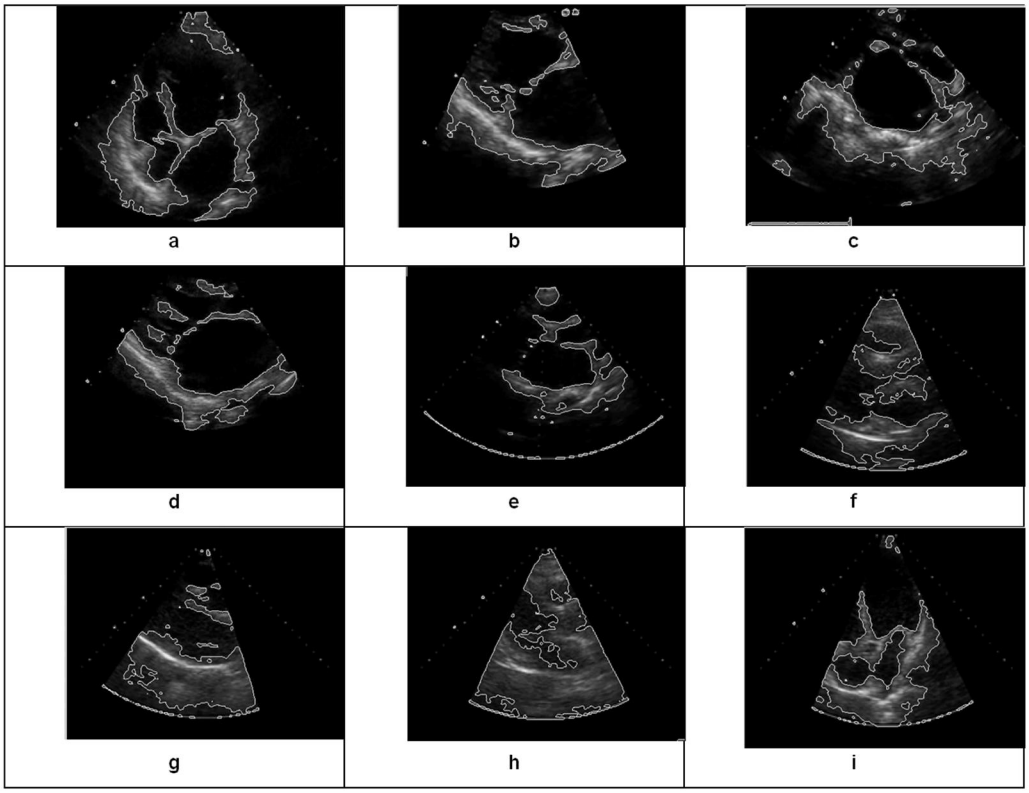

Fig. 6. Boundary detection of echocardiographic images with proposed model

4 DISCUSSION

The proposed model is also the most efficient when compared with the other models in terms of the number of iterations and time it takes to converge. It takes lowest time and iterations. Table 1 shows the iterations and time taken by GAC, C-V, SBGFRLS and the proposed model. From observations from the table 1 it is seen, whereas the GAC model, C-V model and The SBGFRLS models takes 1400 to 4000, 1500 to 2500 and 100 to 200 iterations respectively, the proposed model takes only 30 to 60 iterations to converge; and whereas these three models take the total time to converge ranging from 142.79 to 485.28 seconds, 34.01 to 62.80 seconds and 2.15 to 4.68 seconds respectively, the proposed model takes total time ranging from 0.64 to 1.13 seconds only.

Table 1. Comparison between GAC, C-V, SBGFRLS and proposed model based on CPU efficiency

Images	GAC Model		C-V Model		SBGFRLS Model		Proposed Model	
	Iterations	Time (sec.)	Iterations	Time (sec.)	Iterations	Time (sec.)	Iterations	Time (sec.)
1	2300	278.94	1500	36.35	150	3.32	40	0.81
2	2500	250.49	1800	44.19	150	3.24	40	0.75
3	2300	300.67	2500	62.86	100	2.15	30	0.64
4	2500	270.73	1900	40.75	150	2.86	40	0.73
5	2500	389.96	2000	47.98	200	4.68	50	0.95
6	3000	386.51	1800	43.61	150	2.96	50	0.96
7	4000	485.28	2000	46.47	200	4.16	40	0.76
8	1400	142.79	1500	34.01	150	2.89	60	1.13
9	3200	365.06	1600	36.84	200	4.29	50	0.95

The statistical analysis have also been done to show graphically as in figs. 7a, 7b, 7c and 7d for mean, median, standard deviation and variance respectively, for the per iteration time taken in GAC, C-V, SBGFRLS and the proposed model.

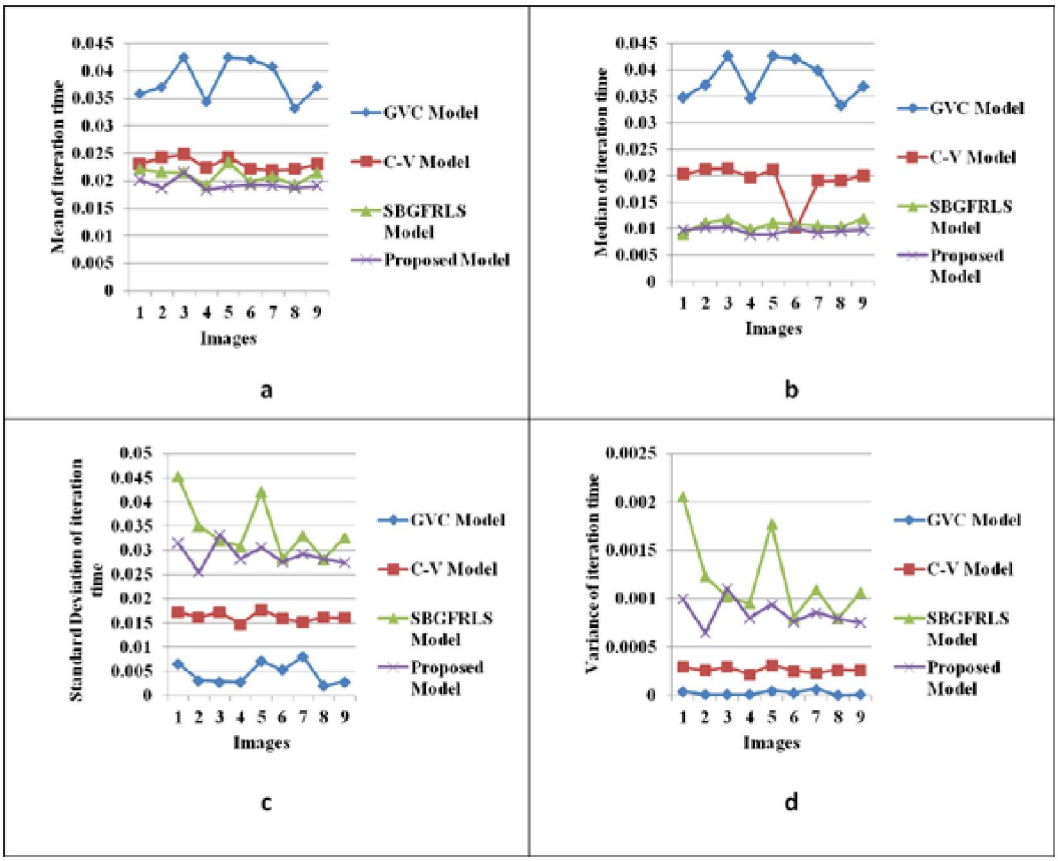

Fig. 7. Statistical analysis of the proposed model along with other models for the per iteration time taken to converge

5 CONCLUSION

The proposed model presents a method to detect boundaries of echcardiographic images automatically. Automatic detection of boundaries enables the clinicians to determine the chambers efficiently and carry out easy diagnosis. The proposed method is efficient in terms of detecting the proper boundaries with the highest clearity. It exhibits much higher CPU efficiency which is of very high significant to the clinicians for carrying out speedy diagnosis. The new SPF developed in this paper can also be used with all types of active contours.

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Hématome retro-placentaire et mort fœtale in utero: A propos de 49 cas et revue de la littérature

[The retro placental hematoma and fetal death in utero: About 49 cases and review of the literature]

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ABSTRACT: The Retro Placental Hematoma (RPH) or placental abruption untimely normally inserted paroxysmal is an accident that threatens maternal and fetal prognosis. It is a major emergency obstetric pathology and remains the second leading cause of maternal mortality after postpartum haemorrhage. It is actually very difficult to have an accurate evaluation the frequency of the HRP because it requires a complete table including Pathologists; or simple macroscopic or microscopic findings; or purely clinical diagnosis for some. Its occurrence requires appropriate resuscitation and adapted care to improve the prognosis. We report our study of 49 cases the HRP hospitalized in Obstetrics and Gynecology of Instruction Military Hospital Mohamed V in Rabat, diagnosed on a suggestive clinical picture and the presence of hematoma after examining the issue. This is a descriptive and comparative retrospective study over a period of one year. This study compared two groups: with HRP feotale death in utero and HRP without fetal death in utero. This study aims to evaluate neonatal mortality and maternal morbidity related to RPH and therapeutic modalities. This pathology formerly known pathology multiparous tends to reach more and more heifer. The important blood loss and delay the expulsion worse prognosis causing severe maternal morbidity hence the need to expand the indications for cesarean of retro placental hematoma regardless of the fetal state. Our study aims to contribute to reduce mortality and morbidity Fetomaternal by improving our work is stepping up efforts for a rapid decision-making, and we must educate what especially pregnant women of the risk factors to see from the beginning of symptoms. The pregnancy monitoring, early diagnosis of RPH, an obstetrical treatment adequate, and a resuscitation well driving can improve the prognosis of this disease.

KEYWORDS: Retro Placental Hematoma, Fetal Death In Utero, Maternal Prognosis, Complications, Treatment.

RESUME: L'hématome rétro placentaire (HRP) ou le décollement prématuré du placenta normalement inséré est un accident paroxystique qui menace le pronostic maternel et fœtal. Il constitue une urgence majeure en pathologie obstétricale et demeure la deuxième cause de mortalité maternelle après les hémorragies de la délivrance. Il est en fait très difficile de disposer d'une évaluation précise de la fréquence de l'HRP car la définition des auteurs varie selon le mode de diagnostic pare ce qu'il nécessite un tableau complet incluant l'anatomopathologie, ou simples constatations macroscopiques ou microscopiques, voire diagnostic purement clinique pour certains. Sa survenue nécessite une réanimation appropriée et une prise en charge adaptée afin d'améliorer le pronostic de cette pathologie. Nous rapportons notre étude de 49 cas d'HRP hospitalisés dans le service de la Gynécologie-Obstétrique de l'Hôpital Militaire d'Instruction Mohamed V de Rabat, diagnostiqué sur un tableau clinique évocateur et la présence de l'hématome après examen du délivre. C'est une étude rétrospective descriptive et comparative sur une durée d'une année. Cette étude compare deux groupes : HRP avec mort fœtale in utero et HRP sans mort fœtale in utero.
Le but de cette étude est d'évaluer la mortalité néonatale et la morbidité maternelle liée à l'HRP ainsi que les modalités thérapeutiques. Cette pathologie anciennement connue pathologie de la multipare tend à atteindre de plus en plus la

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primipare. La spoliation sanguine importante et le retard à l'expulsion aggravent le pronostic entrainant une morbidité maternelle grave, d'où l'intérêt d'élargir les indications de césarienne pour hématome rétro placentaire quel que soit l'état fœtal. Notre étude vise à contribuer à la réduction de la mortalité et de la morbidité fœto-maternelle par l'amélioration de notre travail on multipliant les efforts pour avoir une rapidité dans la prise de décision et il faut sensibiliser les femmes enceintes surtout qu'ont des facteurs du risque de consulter dès le début des symptômes.
Le suivi des grossesses, le diagnostic précoce de HRP, une prise en charge obstétricale adéquate et une réanimation bien conduite amélioreraient le pronostic de cette pathologie.

MOTS-CLEFS: Hématome Rétro Placentaire, Mort Fœtale In Utero, Complications, Pronostic Maternel, Traitement.

1 INTRODUCTION

L'hématome rétro-placentaire (HRP) est le décollement prématuré du placenta normalement inséré par un hématome situé entre la paroi de l'utérus et le placenta. C'est un syndrome paroxystique des derniers mois de la grossesse ou du travail, caractérisé anatomiquement par un état hémorragique allant du simple éclatement d'un infarctus du placenta jusqu'aux raptus hémorragiques atteignant toute la sphère génitale, et pouvant même la dépasser.

Il est en fait très difficile de disposer d'une évaluation précise de la fréquence de l'HRP car la définition des auteurs varie selon le mode de diagnostic (tableau complet incluant l'anatomopathologie, ou simples constatations macroscopiques ou microscopiques, voire diagnostic purement clinique pour certains).

L'étude a pour objectif de décrire les aspects épidémiologiques, cliniques et pronostiques de l'hématome rétro-placentaire dans le service de Gynécologie-Obstétrique de l'Hôpital Militaire d'Instruction Mohamed V de Rabat, afin d'en améliorer la prise en charge.

2 MATERIELS ET METHODES

Nous rapportons notre étude rétrospective descriptive et comparative sur une durée d'une année. Cette étude concerne les patientes hospitalisées dans le service de Gynécologie-Obstétrique de l'Hôpital Militaire d'Instruction Mohamed V de Rabat, pour HRP diagnostiqué sur un tableau clinique évocateur et la présence de l'hématome après examen du délivre. Durant la période de l'étude nous avons colligé 49 cas d'HRP. Notre étude compare deux groupes :

- des HRP avec MFIU[1] dont 31 cas soit 64%.
- et des HRP sans MFIU dont 18 cas soit 36%.

L'étude s'est basée sur les variables suivants :

- L'âge ;
- L'âge gestationnel, divisé en 4 groupes :
  - Jusqu'à 32 SA[2] ;
  - 34 SA ;
  - 36 SA ;
  - Plus de 36 SA.

Le délai de la prise en charge, c'est-à-dire le temps entre le début des symptômes rapportés par la malade et l'admission à l'hôpital.

L'intervalle d'hospitalisation-décision, c'est-à-dire le temps entre l'hospitalisation de la patiente et la décision obstétricale.

[1] Mort Fœtale In Utero.
[2] Semaine d'Aménorrhée.

3 RESULTATS

3.1 ASPECTS ÉPIDÉMIOLOGIQUES

Le tableau 1 montre la répartition des patientes selon l'âge tandis que le tableau 2 illustre la répartition des patientes selon la parité.

Tableau 1. Répartition des patientes en fonction de l'âge

Age	Nombres	%
< 19 ans	4	8,5
20-29 ans	14	29,8
30-39 ans	10	21, 3
≥ 40 ans	5	11 ,2
Non déterminé	16	34
Total	49	100

D'après le tableau 1, l'âge moyen de nos patientes est de 30,82 ans. L'écart type est de l'ordre de +/- 5,73 ans, avec des extrêmes de 17 et 45 ans.

Tableau 2. Répartition des patientes en fonction de la parité

Parité	Nombres	%
I	17	26 ,2
II-III	10	21,3
IV-V	3	4, 6
≥ VI	3	4 ,6
Non déterminé	16	34
Total	49	100

De même, selon le tableau 2, la parité moyenne est de 2 enfants. L'écart type est évalué à +/- 3 enfants et les primipares représentaient une part non négligeable avec 26,2%.

3.2 MODALITÉS THÉRAPEUTIQUES ET COMPLICATIONS

Tableau 3. Comparaison des deux groupes avec et sans MFIU

	G1 : HRP avec MFIU (moy)	G2 : HRP sans MFIU (moy)	P
Age	30.83 +/- 5.73 (ans)	26.93 +/- 6.95	0.05
Age gestationnel	31.1 +/-5.6 (SA)	29.1 +/- 7.85	0.006
Parité	2.27 +/- 1.68	1.78 +/- 1.64	0.003
Nombre d'enfants	2.5 +/- 1.62	2.22 +/- 2	0.0045
Délai de la prise en charge (h)	15.13 +/- 8.78	6.13 +/- 3.9	0.0016
Intervalle hospitalisation-décision (h)	34.10 +/- 14.77	8.16 +/- 6.75	0 .008
Troubles de l'hémostase (CIVD[3])	24.43 +/- 5.71	27.38 +/- 7.92	NS
Saignement calculé (ml)	2281.3 +/- 1199.35	2330.3 +/- 2011.85	NS
Transfusion (Nombre CG[4])	3.33 +/- 2.17	7.33 +/- 0.1	0.04
Insuffisance rénale aigue	5 (17.2%)	2 (11.8%)	0.01
Inertie uterine	0	2 (11 .8%)	0.05
Durée de séjour (J)	2.57 +/- 1.63	3 +/- 2.03	NS

D'après le tableau 3, nous constatons en effet l'existence d'une grande différence entre les deux groupes, surtout en ce qui concerne le délai de la prise en charge et l'intervalle hospitalisation-décision, ce qui reflète l'aggravation des complications. Ceci montre également qu'il faut améliorer notre travail en multipliant les efforts pour avoir une rapidité dans la prise de décision. Aussi, il faut sensibiliser les femmes enceintes surtout celles qu'ont des facteurs de risque de consulter dès le début des symptômes.

4 DISCUSSIONS

4.1 FACTEURS DE RISQUE

Plusieurs facteurs ont été incriminés dans la survenue de l'HRP. Selon certains auteurs, l'âge avancé de la mère a été identifié comme un principal facteur. Ainsi, Corréa par exemple rapporte 39,5 % de patientes âgées de plus de 30 ans [1]. De même, Thoulon [2] trouve un taux de 51% de femmes âgées. Diallo [3], quant à lui, trouve 42,7 % de patientes âgées de 30 ans et plus. Enfin, le taux d'âge avancé de notre étude, estimé à 33 %, est retrouvé chez les patientes âgées de 30 ans et plus. Cependant, les adolescentes occupent une place non négligeable avec 8,5 % dans notre série et 6,7 % seulement selon Diallo.

La multiparité a été également incriminée comme facteur favorisant l'HRP. Dans sa série, Diallo décrit que 44,33 % des patientes ayant fait un HRP avaient une parité supérieure à 5. Notre étude, bien que mettant en évidence une fréquence élevée de patientes ayant une parité supérieure à 3 (21,2 %), révèle une fréquence plus élevée chez les primipares avec 26,4 %. Cette proportion élevée de primipares reste supérieure à celle observée par Diallo qui retrouve 14,6 % de primipares.

L'hypertension artérielle qui est aussi un facteur prédisposant a été retrouvée dans notre série avec 20 % de toxémie et 17,1 % d'hypertension artérielle antérieure à la grossesse. Ce facteur a été également affirmé par Dumont [4] et Diallo. Selon Lang [5], l'élévation de la pression diastolique (> à 95 mm Hg) au cours de l'hypertension artérielle est responsable de la mort fœtale liée à l'HRP. Dans notre série, la mort fœtale diagnostiquée dès l'admission est évaluée à 64%.

Le risque de survenue de l'HRP est également lié au mauvais suivi de la grossesse. En effet l'absence ou l'insuffisance de suivi prénatal et donc l'absence de diagnostic et de prise en charge correcte de tous les facteurs de risque au cours de la grossesse entrainent la survenue de l'HRP. Les antécédents vasculo-rénaux sont représentés ici uniquement par les antécédents d'HTA relevés dans les dossiers cliniques des malades. Par ailleurs, les dossiers cliniques ne précisent pas s'il s'agit d'une HTA gravidique ou d'une HTA antérieure à la grossesse.

[3] Coagulation Intraveineuse Disséminée.
[4] Culot Globulaire.

Il est en fait très difficile de disposer d'une évaluation précise de la fréquence de l'HRP car la définition des auteurs varie selon le mode de diagnostic : tableau complet incluant l'anatomopathologie, ou de simples constatations macroscopiques ou microscopiques, voire parfois un diagnostic purement clinique pour certains.

4.2 ANATOMOPATHOLOGIE

La lésion anatomique responsable est constituée d'un hématome décidual basal dû à la rupture d'une artère utéro-placentaire qui, en interrompant la circulation materno-fœtale, entraîne rapidement des troubles hémodynamiques associés à une souffrance fœtale et à des anomalies de la coagulation [7], [8].

Les lésions de l'utérus consistent en une infiltration sanguine du myomètre, dont l'intensité est variable. Macroscopiquement, dans les formes moyennes, de larges ecchymoses occupent les deux faces. La teinte va du rouge cuivre au bleu foncé et au noir (utérus bigarré) réalisant un aspect apoplectique typique lors de la césarienne: l'apoplexie utéro placentaire de Couvelaire. Au microscope, la lésion essentielle est l'éclatement des capillaires. Les annexes (trompes, ovaires, ligaments larges et ligaments ronds) peuvent participer au processus apoplectique. Les lésions hémorragiques peuvent dans les formes graves, atteindre des viscères non génitaux, notamment le foie, les reins et le pancréas. La mort fœtale est la conséquence fréquente des bouleversements utéro placentaires et de l'extrême hypertonie utérine [9], [10].

4.3 PHYSIOPATHOLOGIE

L'HRP est associé à des circonstances étiologiques très diverses liées probablement à des mécanismes très différents dont beaucoup demeurent encore méconnus.

La théorie classique admet que l'HRP, dans sa forme la plus typique, survient dans le cadre d'une maladie vasculaire [11], [10].

De nombreuses études ont démontré que l'un des mécanismes initiaux de l'anomalie de placentation est constitué par une altération de l'invasion trophoblastique des artères spiralées. Ceci aboutit à une ischémie utéro-placentaire d'autant plus importante qu'il existe un terrain favorable.

4.4 DIAGNOSTIC DE L'HRP

Le diagnostic de l'hématome rétro placentaire repose sur la douleur apoplectique horaire qui reste associée à la contracture utérine, à la diminution des mouvements actifs fœtaux et à l'hémorragie de sang noir.

La césarienne en extrême urgence est indiquée en cas d'anomalie du rythme cardiaque fœtal. En cas de mort fœtale, l'accouchement par voie vaginale est privilégié. Les troubles de l'hémostase s'associent au choc hémorragique et l'aggravent.

L'hématome rétro placentaire survient le plus souvent de façon imprévisible. Des signes de choc hémorragique sont parfois associés lorsque l'hématome est important. L'hématome rétro placentaire prend alors la forme clinique d'une menace d'accouchement prématuré et/ou d'une souffrance fœtale aiguë ou d'une mort fœtale inexpliquée.

L'hématome rétro placentaire peut passer inaperçu lorsque l'expression clinique est la mise en route du travail obstétrical, volontiers hypercinétique et hypertonique compliqué d'anomalies de rythme cardiaque.

Le diagnostic de l'HRP peut être alors porté par l'examen du placenta après l'accouchement par voie basse ou la césarienne.

Ainsi, sur la base de ces disparités cliniques, deux classifications sont proposés dans la revue de la littérature: celle de Page [12] comportant quatre stades : le stade 0 : diagnostic anatomopathologique sans symptomatologie, le stade 1 : forme frustre avec enfant vivant, le stade 2 : forme moyenne avec troubles de la coagulation débutants et le stade 3 : forme grave avec troubles de la coagulation et mort fœtale in utero.

La classification de Sher [13] comporte 3 stades : le stade 1, moyen avec métrorragie inexpliquée et diagnostic rétrospectif post-partum d'un petit hématome, le stade 2, intermédiaire avec hypertonie utérine et enfant vivant, le stade 3, sévère avec mort fœtale. Ce troisième stade est subdivisé en stade 3A, sans coagulopathie et stade 3B, avec coagulopathie.

Les anomalies biologiques et les atteintes cliniques associées aux hématomes rétro placentaires de faible importance et pauci symptomatiques sont résolutives spontanément avec l'accouchement et l'expulsion du placenta (A.-S. Ducloy-Bouthors, E. Jessenne, B. Dedet, P. Deruelle, A. Tournoys, J. Sicot…).

L'importance du choc hémorragique ne doit pas être sous-estimée. L'utérus distendu peut en effet être le siège d'un volume d'hémorragie de 4 litres et plus. La correction rapide de la volémie et de l'anémie est obtenue selon les principes décrits ultérieurement.

Les troubles de l'hémostase sont décrits comme associant une coagulation intravasculaire disséminée selon les critères de l'ISTH à une fibrinolyse et fibrinogénolyse réactionnelle majeure [13], [14]. Sher évoque plusieurs mécanismes à ces troubles de l'hémostase. La contracture utérine et l'ischémie associée jouent un rôle protecteur du reste de l'organisme maternel vis-à-vis de cette libération massive de t-PA. Sher incrimine les produits de dégradation de la fibrine et du fibrinogène (PDF) dans la genèse d'une partie de l'hypocoagulabilité et dans l'atonie utérine constatée pour certains de ces HRP. Elle n'est pas sensible aux ocytociques [12], [15], [13]. L'objectif au cours de l'accouchement par voie basse ou de la césarienne si elle est nécessaire, est de rendre la patiente coagulable au moment de la délivrance. La condition sine qua non à la coagulabilité de la patiente est d'obtenir et de maintenir un taux de fibrinogène supérieur à 1 g/l. Cette condition est obtenue par plusieurs pratiques de réanimation dont aucune n'a fait la preuve de sa supériorité : la perfusion de 10–20 ml/kg de plasma congelé ou la perfusion de 0,05 à 0,1 g/kg de fibrinogène ou l'emploi d'anti fibrinolytiques. Sher préconise l'emploi de l'aprotinine qui est un inhibiteur de la plasmine, de l'antithrombine et de la kallicréine à la posologie de 1000 000 Unités.

L'état de choc hémorragique peut se compliquer d'une défaillance multiviscérale rénale, hépatique ou neurologique et de mort maternelle (7 % à 20 % des morts maternelles par hémorragies) [16], [15].

Au total, la majorité des formes cliniques est trompeuse à type de métrorragies isolées, de souffrance fœtale ou d'hypertonie-hypercinésie utérine. Si la césarienne permet de diminuer la mortalité périnatale (20 à 50 %) dans les hématomes rétro placentaires avec enfant vivant, l'accouchement par voie basse est préconisé dans les hématomes rétro placentaires avec enfant mort. Ceci ne peut se produire qu'après la correction de l'état de choc hémorragique, des anomalies de l'hémostase à type de coagulation intravasculaire aiguë fibrinolytique et de l'atonie utérine. Le plus souvent ce résultat ne peut être atteint qu'après l'accouchement.

4.5 EVOLUTION ET COMPLICATIONS

L'évolution des HRP est le plus souvent favorable. Beaucoup d'HRP évoluent eux-mêmes vers la guérison après un accouchement rapide aidé par l'ouverture spontanée ou artificielle de l'œuf. La délivrance suit de près l'accouchement, accompagnée d'une abondante émission de caillots noirs. La prise en charge maternelle par une réanimation intensive et efficace, ne permet pas d'éviter dans tous les cas les complications qui restent possibles, notamment :

- le choc hypovolémique ;
- les troubles de la crase sanguine ;
- l'atonie utérine par inertie ;
- le choc hémorragique ;
- l'oligoanurie par insuffisance rénal ;
- la mort maternelle pouvant survenir au décours de toutes ces complications ;
- Complications fœtales.

Le pronostic fœtal est en général mauvais. Ce pronostic est lié essentiellement à l'étendue du décollement, aux lésions utérines associées et à l'importance du choc.

Si le fœtus survit, la morbidité post-natale n'est pas nulle, avec possibilité de séquelles neurologiques. Notons qu'il existe cependant une disproportion entre la durée et l'intensité des anomalies du rythme cardiaque fœtal et l'importance de la morbidité néonatale.

4.6 TRAITEMENT

4.6.1 TRAITEMENT CURATIF

4.6.1.1 LES BUTS

Les buts du traitement de l'HRP découlent de la physiopathologie. Ses objectifs sont au nombre de quatre:

1) Evacuer l'utérus du fœtus et de son placenta, source des enzymes perturbant la coagulation

L'analgésie péridurale est formellement contre-indiquée en présence de troubles de la coagulation. Certains auteurs préfèrent réaliser l'accouchement sous anesthésie générale permettant de réaliser rapidement une délivrance artificielle et une révision utérine qui sont largement préconisées.

La qualité de la rétraction utérine doit être rapidement vérifiée, et renforcée par des ocytociques, éventuellement des analogues des prostaglandines E2. L'opération est accompagnée de mesures de réanimation du rétablissement de la masse sanguine, et du maintien électrolytique, qui laissent cette intervention sans danger.

La césarienne doit être conservatrice, et l'hystérectomie n'a que d'exceptionnelles indications: ces utérus bigarrés retrouvent après leur évacuation leur totale valeur fonctionnelle.

La morbidité maternelle est fortement dominée par l'anémie aiguë liée à la spoliation sanguine. Cette anémie se manifestait encore dans les suites de couches comme l'a aussi constaté Dumont dans sa série. En fait, il existe deux situations :

- ***Lorsque le fœtus est mort,*** la voie basse est préférable. Dans la plupart des cas, l'amniotomie est réalisée précocement (ce qui permet à la fois de diminuer la pression intra-amniotique et de favoriser la marche du travail) à l'exception des cas où il existe un fœtus très petit ou une position transverse. Si le travail progresse mal, on peut y adjoindre la perfusion intraveineuse lente d'ocytociques (s'il n'y a pas de contre-indication à leur utilisation). L'hypercinésie utérine la rend souvent inutile. Classiquement les délais admis pour l'évacuation utérine ne doivent pas excéder quatre heures, voire douze heures pour certains. Le délai d'attente dépend en fait du bilan d'hémostase et de l'hémodynamique maternelle. La césarienne doit être pratiquée avant que le temps perdu à attendre n'ait aggravé l'état général, le but étant de protéger la vie maternelle.

- ***Lorsque le fœtus est vivant,*** ce sont le rythme cardiaque fœtal et l'état général maternel qui guident la décision. Dans l'immense majorité des cas, une césarienne sera pratiquée. Cependant, dans quelques cas (en particulier si l'HRP ne parait pas récent), si les conditions locales sont très favorables, l'accouchement par voie basse peut être accepté et déclenché à condition que le tracé du rythme cardiaque fœtal reste normal. La rupture artificielle des membranes est alors réalisée le plus précocement possible.

- ***La période du post-partum*** est marquée par une élévation du risque infectieux, du risque thromboembolique qu'il faudra savoir prévenir. La prise en charge contraceptive dans le post partum immédiat devrait être plus systématique afin d'éviter la tackyparité mais aussi de permettre une exploration biologique et un suivi à long terme des parturientes ayant fait un HRP.

2) Traiter le choc hypovolémique

Il est essentiel et tient compte du fait que le saignement extériorisé est toujours inférieur à la déperdition sanguine réelle. Il fait appel essentiellement au sang total et à ses dérivés (culots érythrocytaires, plasma frais-congelé), en respectant les règles strictes d'une transfusion sanguine. Les solutions cristalloïdes type Ringer peuvent être utilisées, de même que les solutés électrolytiques (sérum salé, glucosé, bicarbonaté) placés en dérivation pour restaurer le liquide interstitiel. Il est parfois nécessaire d'installer un contrôle de la pression veineuse centrale [12], [17], [8].

3) Traiter les troubles de la coagulation

Ce traitement doit être précoce. Il a pour vocation de lutter contre la CIVD. Cette lutte passe par le maintien de l'hématocrite. L'utilisation de plasma frais-congelé ABO-compatible, permet d'apporter du fibrinogène et des facteurs de la coagulation. La transfusion de plaquettes (ABO-compatible) n'est utile que si l'on a un taux de plaquettes inférieur à 50 000, s'il existe des anomalies du temps de saignement, et immédiatement avant la césarienne ou l'accouchement.

D'autres produits ne sont plus aujourd'hui utilisés par la plupart des praticiens : il s'agit de l'héparine (dont l'intérêt théorique dans la lutte contre la CIVD est largement contre balancée par les risques d'hémorragie secondaire), du fibrinogène, de l'acide alpha amino-caproïque, et des anti-fibrinolytiques tel l'acide tranexamique. En cas d'hypofibrinogénémie sévère, l'utilisation de cryoprécipités peut être utile [12], [17], [8].

4) traiter l'atteinte rénale éventuelle

En cas d'oligurie ou d'anurie persistante, seront indiqués l'emploi du Furosémide à haute dose, associé à une compensation hydro électrolytique précise. La dialyse péritonéale ou l'hémodialyse étant indiqués dans les rares cas où il existe un rein artificiel. La durée de cette anurie est très variable, pouvant être définitive [8].

4.6.1.2 LES MOYENS

La patiente doit être prise en charge par une équipe comprenant au minimum un obstétricien et un anesthésiste-réanimateur.

Certaines précautions doivent cependant être prises:

- un bilan initial doit être entrepris, comprenant la détermination du groupe sanguin Rhésus, une étude des éléments biologiques de la coagulation (temps de coagulation, temps de saignement, dosage du fibrinogène, numération des plaquettes, taux de prothrombine), l'hématocrite, le dosage de l'urée, de l'acide urique, de la réserve alcaline... Cette liste s'allonge en fonction des moyens disponibles. Ces examens doivent être répétés aussi souvent que nécessaire, au maximum toutes les trois heures pour les examens explorant la coagulation ;
- une sonde urinaire doit être mise en place permettant de mesurer la diurèse et la protéinurie ;
- un cathéter veineux laissé en place permettant le contrôle périodique de la coagulation et la perfusion de tout médicament jugé utile.

4.6.2 TRAITEMENT PRÉVENTIF

Le seul moyen pharmacologique qui ait été réellement proposé est l'Aspirine®. Les résultats dont on dispose actuellement comportent un nombre insuffisant d'HRP pour pouvoir réellement conclure.

Quoi qu'il en soit, plusieurs auteurs continuent à traiter par l'Aspirine® les patientes ayant dans leurs antécédents un ou deux HRP dans un contexte de retard de croissance intra-utérin ou d'hypertension artérielle [18], [19], [8].

5 CONCLUSION

L'hématome rétro placentaire reste une pathologie obstétricale préoccupante. Cette pathologie anciennement connue par pathologie de la multipare tend à atteindre de plus en plus la primipare. La spoliation sanguine importante et le retard à l'expulsion aggravent le pronostic entrainant une morbidité maternelle grave, d'où l'intérêt d'élargir les indications de césarienne pour hématome rétro placentaire quel que soit l'état fœtal.

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Sink Level Detection Using Localization Algorithm in Ship Detection Using Wireless Sensor Networks

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ABSTRACT: Intrusion detection and border surveillance constitute a major application category for wireless sensor networks. A major goal in these applications is to detect intruders as they cross a border or as they penetrate a protected area. WSN is usually composed of small, low-cost devices that communicate wirelessly and have the capabilities of processing, sensing and storing. It typically consists of large number of resource-limited sensor nodes working in a self-organizing and distributed manner. Due to the ad hoc working style, once deployed, the inner structures and interactions within a WSN are difficult to observe from the outside. Intrusion detection using three-tier accelerometer sensors detect intrusion ships. The sensors deployed on the sea surface get tossed by ocean waves which makes them move randomly. This random movement of the node makes it difficult for most sensors to detect an intrusion. Network data processing with spatial and temporal correlations between nodes estimates the speed of a passing ship. Using signal processing and cooperative signal processing techniques the ocean waves and ship-generated waves are differentiated accordingly with their respective different energy spectrums. Though the algorithm detects multiple ships travelling along distances in different geographical areas it requires a relatively dense network especially to achieve a high detection ratio due to larger attenuation. To resolve such issues the proposed approach introduces the concept of Adaptive self-organizing localization algorithm. This is included in sink level detection to deal with invasion detection ships.

KEYWORDS: Three-tire accelerometer sensor, attenuation, correlation, temporal correlation, spatial correlation.

1 INTRODUCTION

The nodes communicate wirelessly and often self-organize after being deployed in an ad hoc fashion [1]. It is an infrastructure comprised of sensing (measuring), computing, and communication elements that gives the user the ability to instrument, observe, and react to events and phenomena in specified environment. Currently, WSNs are beginning to be deployed at an accelerated space. In a typical application a WSN is scattered in a region where it is meant to collect data through its sensor nodes. WSN are being used in many industrial, surveillance or military applications and civilian application areas including industrial process monitoring and control machine health monitoring, environment and habitat monitoring, healthcare applications, home automation and traffic control [1].

Detection, classification and tracking of targets are a basic surveillance or military application, and have hence received a considerable amount of attention in the literature. Recent developments in the miniaturization of sensing, computing, and communications technology have made it possible to use a plurality of sensors within a single device or sensor network node.

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Their low cost makes it feasible to deploy them in significant numbers across large areas and consequently, these devices have become a promising candidate for addressing the distributed detection, classification and tracking problem.[2]

To provide sensing coverage for a relatively large area, the network is usually comprised of a large number of densely deployed nodes. This imposes a challenge on efficient data propagation and reliable operation. The detection, classification and reporting must be performed in a timely manner. It is usually required that the network completes the detection and classification before the target travels out of the field so that the system can respond to the event. As a result, offline-style processing performed by base stations with global and relatively "complete" data is often not feasible in this context. To perform quality signal processing, the sensors often need to sample at a high sampling rate, stressing resource utilization. The sensing data is bursty and will be in large quantity. Thus surveillance networks are often deployed on rough terrains for a long period of time. Hence it must be adaptive to the realistic, ever-changing environment [3] .The algorithm tracks the target in real-time does not require time synchronization between sensor nodes and can be applied to targets moving in random directions and with varied velocities. Moreover, the algorithm is tolerant to sensing faults, when a sensor either fails to detect a target within its range as well as information loss caused by packet collisions.

WSN with three-axis accelerometer sensors measure the actual surface movement of ship-generated waves to exploit spatial and temporal correlations of an intrusion of ships which increases detection reliability.

2 RELATED WORKS

The fundamental function in wireless sensor networks is to sense the network using the nodes deployed randomly. The raw sensor data is often of low quality, that is they are not reliable. So it is necessary to use signal processing algorithms to provide precise, reliable and easy to use information. The group level classification is of special importance to the detection and classification performance. It not only controls the aggregation of member reports and reduces the network traffic, but also reduces the false positive rate of the system. The hierarchical architecture naturally distributes sensing and computation tasks at different levels of the system so that the sensor network can support high-quality sensing and reliable classification without involving special high-power nodes [4].Often sensor nodes within a geographical region will be grouped to form a local cluster so that a certain hierarchy of command and control over the entire sensor field can be established. Each local cluster will elect one or more sensor nodes as the cluster head where spatial decision fusion of sensors within a cluster will be performed. Individual sensors will need to be activated, and then periodically perform target detection algorithm to detect the presence of a moving vehicle in the neighbourhood of the sensor. Using spatial correlation with centralized approach the vehicle is detected [5].

3 SYSTEM DESCRIPTION

The detection of any passing ships by distinguishing the ship generated waves from the ocean waves can be calculated using Short Time Fourier Transform. This is because Ocean waves and ship generated waves have different energy spectrums.

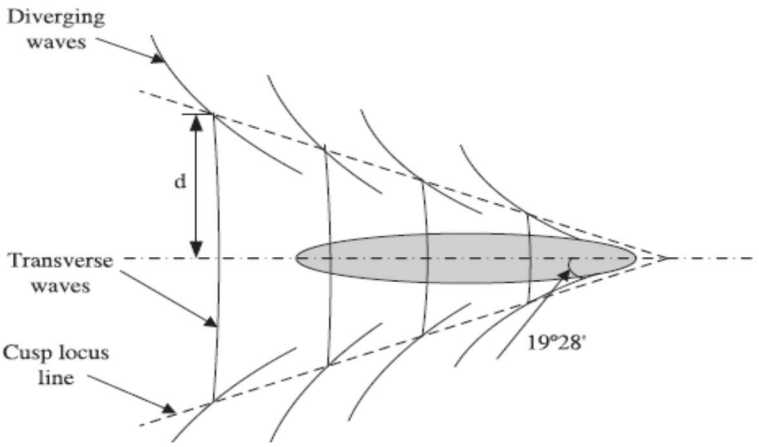

Fig. 1. Ship generated wave model

While ship moving in water, it generates waves which comprise divergent and transverse waves as shown in Fig. 1.

Algorithm: Node algorithm includes initialization of node, intrusion detection, and temporary cluster setup, correlation of spatial and temporal data processing. **Intrusion detection algorithm** includes node-level, sink-level and cluster-level algorithms.

3.1 NODE-LEVEL DETECTION

Once the node detects a target the extracted features are transmitted to the local head node or a sink for further signal processing and classification due to the energy constraints of the sensor node and the limitations of the communication bandwidth [6].

3.2 CLUSTER-LEVEL CLASSIFICATION

The clusters are formed according to the geographical locations of nodes or the migration of the external event after the network deployment. In each cluster, a local head node takes charge of the data fusion or other coordination tasks within the cluster.

3.2.1 CLUSTER-LEVEL DESCRIPTION

When a ship travels through the sensor networks, the waves generated by the passing ship disturb the sensor areas A1; A2; A3 in sequential manner. These areas have spatial and temporal correlations. By exploiting these correlations, we can improve the reliability of the detection system. In order to monitor the entire deployed area, the temporary clusters are combined with static clusters. The static clusters are formed according to the geographical location of the nodes, and temporary clusters are formed on demand when a node's alarm is trigger. Since the nodes positions are fixed, they know where their neighbours are located. When a node discovers a ship intrusion, it initiates a temporary cluster, informs its neighbouring nodes and automatically becomes the temporary cluster head. If more than one node detects a ship intrusion before it receives detection signals from other nodes, it sends out their average detection energy, thus the node with the higher detection energy becomes the cluster head. If the nodes within the cluster also find the intrusion, they report the findings to the temporary cluster head. If the cluster head has not received any report within a certain period of time, it will cancel the temporary cluster because its positive finding may be a false alarm.

3.2.2 SINK-LEVEL DETECTION

Processes the data sent from local head nodes and the final decision will be reported to the external user via satellite or other means. Multitarget detection monitors several intrusion targets at the same time in different geographical areas over large distances [7]. It increases the reliability of the intrusion detection with reduced false alarms with respect to spatial and temporal correlations of detection. The self- organizing localisation algorithm which enhances the sensor nodes to be location-aware is deployed in our proposed system.

4 PROPOSED SYSTEM

The process of finding accurate location of any sensor node is called as localization. The issue of energy efficiency and efficient data transmission is critical due to limited battery power and limited storage capacity of sensors. Spatial correlation is more doubtful due to higher distance among sensors and long propagation delays.

Proposed algorithm

Adaptive self-organizing localization algorithm is developed in proposed system. It can able to operate under modes of parameters such as:

Temperature: Ranges 23to26 degrees centigrade within 33meters.

Distance: Node's deployment distance D is within 40 meters.

The proposed localization technique uses only the distance estimation between the reference Nodes (RN) and Ordinary Nodes (OrN). RNs are able to detect their position by means of GPS to find the accurate location of OrNs. OrNs are those nodes which execute without any centralized control to make randomly deployed WSN to be location-aware. In order to perform collaborative sensing tasks the sensor nodes must estimate their position by means of a distributed positioning algorithm. Average Error (AE) is calculated to weigh the efficiency of proposed algorithm:

$$AE = \frac{\sum_{i=1}^{500} \sqrt{((x_i - x_i^*)^2 + (y_i - y_i^*)^2 + (z_i - z_i^*)^2)}}{500} \quad (1)$$

Where (x_i, y_i) is a real sensor position and (x_i^*, y_i^*) is estimated localization.

4.1 NETWORK MODEL AND NODE LEVEL DETECTION

An undirected graph G (V, E) where the set of vertices V represent the mobile nodes in the network and E represents set of edges in the graph, which represents the physical or logical links between the mobile nodes. Sensor nodes are placed at a same level. Two nodes that can communicate directly with each other are connected by an edge in the graph. Let N denote a network of m mobile nodes, N1, N2...Nm and let D denote a collection of n data items d1; d2; . . . ; dn distributed in the network. For each pair of mobile nodes N_i and N_j, let t_{ij} denote the delay of transmitting a data item of unit-size between these two nodes. The experimental system is with 30 nodes deployed in such a way that five nodes in a row and a total of six rows is kept. The node's deployment distance D is 25 m. The ship travels along one side of the deployed area with three different speed levels and with each speed the test runs some defined rounds.

4.1.1 NODE-LEVEL DETECTION

Sample the event and extract those features. Once the node detects a target the extracted features are transmitted to the local head node or a sink for further signal processing and classification due to the energy constraints of the sensor node and the limitations of the communication bandwidth. Sample the signal value at time t is a_i, the total number of sampling points in time period T is u. The average sample value of this period T and the standard deviation can be computed with threshold as

$$m_{\Delta t} = \frac{1}{u} \sum_{i=0}^{u} a_i, \quad (2)$$

$$d_{\Delta t} = \sqrt{\frac{1}{u} \sum_{i=1}^{u} (a_i - m_{\Delta t})^2} \quad (3)$$

The threshold should reflect those changes. Thus design an environment adaptive threshold by moving the average value and the standard deviation with time. The moving average and the standard deviation is defined as

$$m'_T = \beta_1 \times m_T + m_{\Delta t} \times (1 - \beta_1), \quad (4)$$

$$d'_T = \beta_2 \times d_T + d_{\Delta t} \times (1 - \beta_2), \quad (5)$$

In other words the crossing of the threshold occurs several times within a short period of time. Thus anomaly frequency is defined as

$$a_f = \frac{NA_{\Delta t}}{N_{\Delta t}} \quad (6)$$

4.2 CLUSTER-LEVEL DETECTION AND SINK-LEVEL DETECTION

If more than one node detects a ship intrusion before it receives detection signals from other nodes, the nodes contend to become the temporary cluster head. To simplify the process, when the nodes try to set themselves up as cluster heads, they could also send out their average detection energy thus the node with the higher detection energy becomes the cluster head. If the nodes within the cluster also find the intrusion, they report the findings to the temporary cluster head. If the cluster head has not received any report within a certain period of time, it will cancel the temporary cluster because its positive finding may be a false alarm. However if it receives enough positive reports in a timely fashion it will process the received data using the spatial and temporal correlations of the ship waves. We define time correlations in row i. Because the cluster head knows the positions of each node, we arrange all reports according to their position and reporting time. If the number of ordered reports is N,

$$C_{rt(i)} = \frac{N}{n}, \quad (7)$$

The group's time correlations C_{Nt} defines as

$$C_{Nt} = \pi C_{rt(i)} \quad (8)$$

CNe describes the cluster's energy correlations. The correlation coefficient C measures the spatial and temporal correlations in a cluster and is defined as

$$C = C_{Nt} \times C_{Ne}\,, \tag{9}$$

Estimate the speed of the intruding ship using the equation:

$$V = \frac{D \sin(\alpha - 70^{\circ})}{(t_4 - t_3)\sin \emptyset}\,, \tag{10}$$

$$\alpha = arctan\left(\frac{t_2 + t_4 - t_1 - t_3}{t_2 + t_3 - t_1 - t_4} \tan 70^{\circ}\right) \tag{11}$$

4.2.1 SINK-LEVEL DETECTION

The intruding ship will keep moving it will eventually move away from the monitored area. So it raises false alarm when several clusters are affected and disappears. It process the data sent from local head nodes and the final decision will be reported to the external user via satellite or other means. To distinguish between friend and foe ships add ID to friendly ships. When such ships come, the system will not sound intrusion alarms. Thus it increases the reliability of the intrusion detection with reduced false alarms with respect to spatial and temporal correlations of detection.

4.3 NODE LOCATION ESTIMATION

The proposed localization technique uses only the distance estimation between the reference Nodes (RN) and Ordinary Nodes (OrN). RNs are able to detect their position by means of GPS to find the accurate location of OrNs. OrNs are those nodes which execute without any centralized control to make randomly deployed WSN to be location-aware. In order to perform collaborative sensing tasks the sensor nodes must estimate their position by means of a distributed positioning algorithm. Average Error (AE) is calculated to weigh the efficiency of proposed algorithm using the formula 1.

5 ANALYSIS OF PROPOSED SYSTEM

In order to improve energy consumption in efficient way, localisation algorithm is proposed. It analyse inconsistency caused due to erroneous depth which is calculated using pressure sensors and find the average error in calculated node location. It autonomously performs the assigned task without human intervention. The block diagram describes the overall methodology of the proposed system.

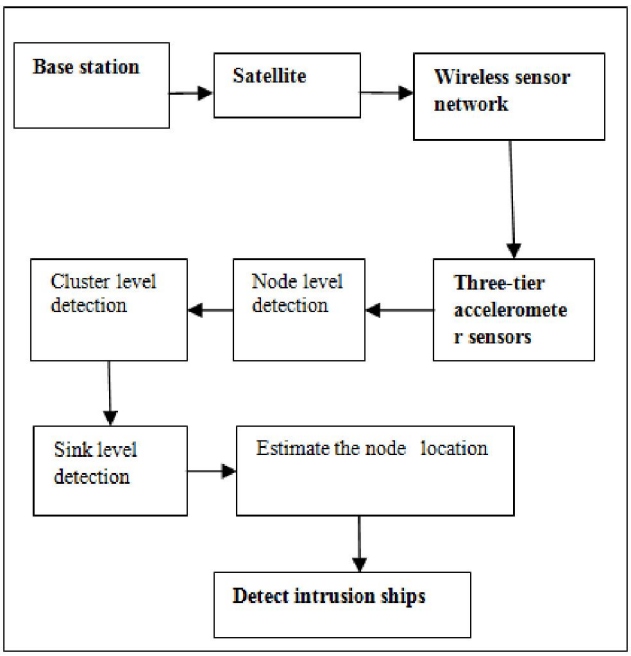

Fig. 2. Block diagram of the proposed work

The block diagram shown in the above fig. 2 describe the working methodology of the proposed system. Using the three-tier accelerometer sensor to detect the intrusion ship. We introduced four detection algorithms namely node level, cluster level, sink level and node location detection to detect the intrusion ship more efficiently and accurately. The following graphs in fig:3 and fig:4 shows the ship speed estimation and success detection in accordance with the intruder ship. The fig:3 shows that minimum, maximum and the average speed that the ship could attain, any ship that exceeds the ratio calculated is considered to be an intruder ship.

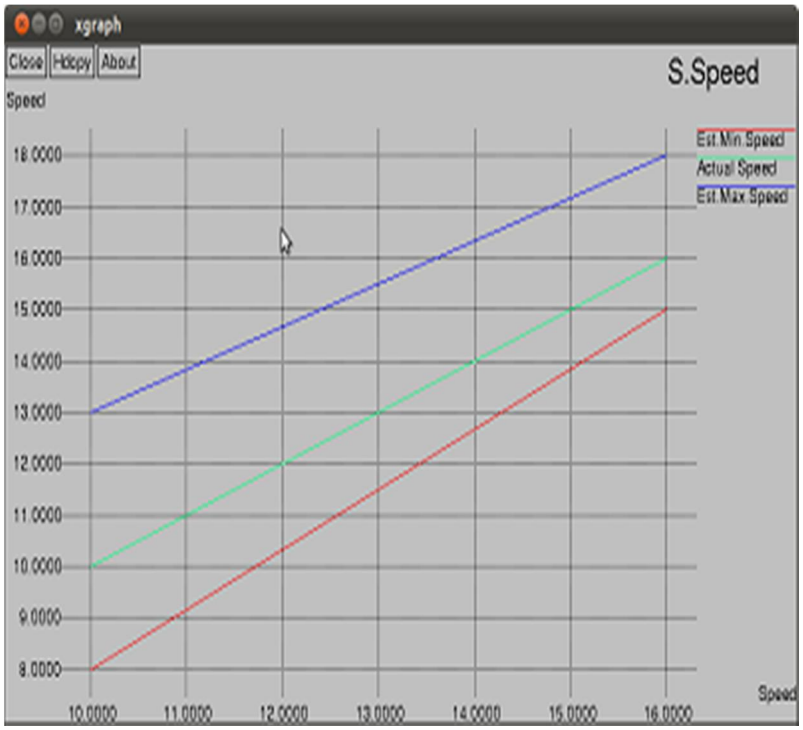

Fig. 3. Ship speed estimation

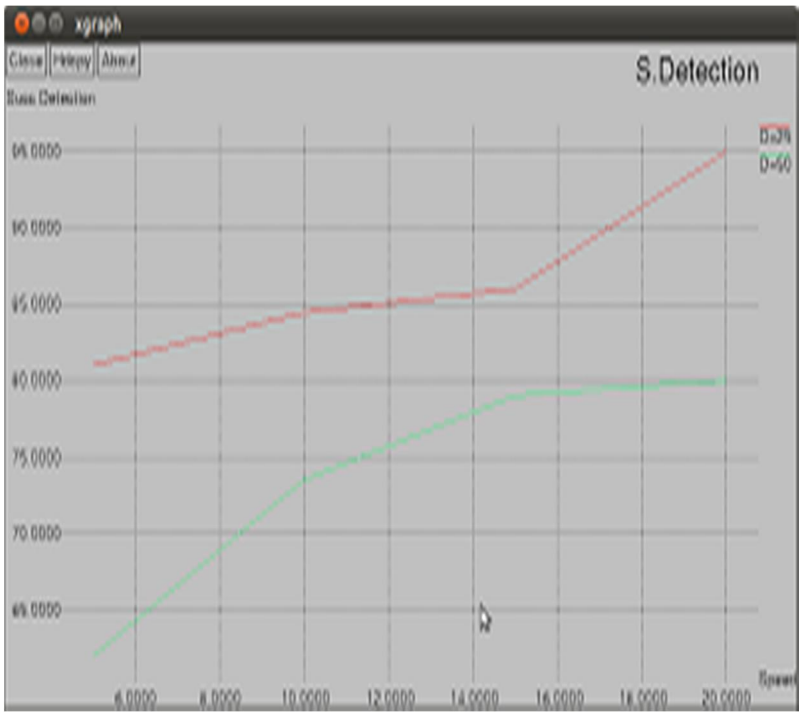

Fig. 4. Success detection

6 IMPLEMENTATION

NS-2 is an open-source simulation tool running on Unix-like operating systems. It is a discreet event simulator targeted at networking research and provides substantial support for simulation of routing, multicast protocols and IP protocols, such as UDP, TCP, RTP and SRM over wired, wireless and satellite networks. It has many advantages that make it a useful tool, such as support for multiple protocols and the capability of graphically detailing network traffic. Additionally, NS-2 supports several algorithms in routing and queuing. LAN routing and broadcasts are part of routing algorithms. Queuing algorithm includes fair queuing, deficit round robin and FIFO.NS-2 started as a variant of the REAL network simulator. REAL is a network simulator originally intended for studying the dynamic behaviour of flow and congestion control schemes in packet-switched data networks. In 1995 ns development was supported by Defence Advanced Research Projects Agency DARPA through the VINT project at LBL, Xerox PARC, UCB, and USC/ISI. The wireless code from UCB Daedelus and CMU Monarch projects and Sun Microsystems has added the wireless capabilities to ns-2. NS-2 is available on several platforms such as FreeBSD, Linux, SunOS and Solaris. NS-2 also builds and runs under Windows with Cygwin. Simple scenarios should run on any reasonable machine; however, very large scenarios benefit from large amounts of memory and fast CPU's.

7 CONCLUSION

The developed architecture enables the system to conduct efficient information processing including detection and classification in a large-scale WSN. This architecture naturally distributes sensing and computation tasks at different levels of the system so that the sensor network can support high-quality sensing and reliable classification without involving special high-power nodes. With evaluation data collected from field tests in physical environments, the evaluation demonstrates excellent performance on the detection rate, classification result, attribute (velocity) computation accuracy and timely information delivery. The developed approach is further extended in future in many ways. Propagation of ship waves over large distances is not concentrated in existing system. Real sensor network system drop buoys from a plane rather than grid environment have to be analysed. Power management in sink level detection is another methodology to improve the performance of the detection system in efficient way. On the other hand seek solution for supporting online intrusion detection system.

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Information Technology: Roles, Responsibilities in Disaster Management

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ABSTRACT: Now, in the era of scientific technology, it is much easier to handle disaster is natural as well as man-made. We can handle a variety of functions that can be used in information technology. It helps to prevent, restore. The development of information technology in the Internet, geographic information systems, remote sensing, satellite communications, so on, helps to assist in the planning, implementation process of risk reduction. Geographic information systems have sufficient capacity and capability to improve the quality and the power of the analysis, the natural hazard assessment, to guide the development of activities as well as assist in the planning of the mitigation measures and implementation of the emergency preparedness for response. Remote sense, however, as a powerful tool that can help you to identify areas of risk, monitoring plan, so that the change in a real-time. Information Technology is playing a big as well as vital role in disaster management. It provides all the required to anticipate, analyze to find the correct solution Just In Time. GIS, remote sensing, other IT tools are available, are being used by different competent authorities for this purpose. Disaster Management is now days a buzz word. Every country, their government, other organizations are working hard to make use of Information Technology in all possible ways to tackle the problems of disaster.

KEYWORDS: Disasters Management, Warning and Forecasting System, Information Technology, GIS.

1 INTRODUCTION

It is well known that natural disasters strike countries, both developed and developing countries, causing enormous destruction and human suffering and create negative consequences for national economies. Due to various geo-climatic conditions prevailing in different parts of the world, different types of natural disasters such as floods, droughts, earthquakes, cyclones, landslides, volcanic eruptions, etc. after strikes vulnerability of the area. India is considered the country's natural disaster world. It has witnessed devastating natural disasters in recent history as droughts, floods, cyclones, earthquakes, landslides...

2 NATURAL DISASTERS IN INDIA

India is a great country and subjected to a series of natural disasters. Among all natural disasters facing the country, the river is flooded. More frequent and often devastating rainfall deficit in stimulus causes such as drought or drought in different parts of the country. The country has experienced an earthquake caused severe damage to life and property. India has a coastline of about 8000 km, which is prone to very severe cyclonic formations in the Arabian Sea and the Bay of Bengal. Another major problem facing the country is in the form of landslides and avalanches.

With an increase in the perception for the promotion of a culture of disaster prevention management, now a major emphasis is placed on research and development of information on disaster preparedness and prevention. It has brought significant positive change, although the number and frequency of disasters in the country has increased.

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3 APPLICATION OF INFORMATION TECHNOLOGY IN DISASTER MANAGEMENT

Although you cannot completely avoid natural disasters, but the suffering can be minimized by creating proper awareness of the potential disasters and their impact by developing a suitable warning system with the use of IT based disaster preparedness and disaster management. The changing trends have opened a wide range of scientific and technological resources and skills to reduce disaster risk.

There are mainly applications you can use to manage disasters:

- GIS and Remote Sensing [1].
- Internet.

4 GIS AND REMOTE SENSING

GIS is an efficient tool for the storage and manipulation of remotely sensed data and other spatial and non-spatial data, both for the management of scientific and policy-based. This can be used to facilitate the measurement, mapping, monitoring and modeling of the various types of data on natural phenomena. The GIS application specific risk assessments are: - Hazard mapping to show earthquakes, landslides, floods or fires. These cards can be created for cities, counties and even for the whole country and the threat of tropical cyclones maps used by the meteorological departments to improve the quality of services of tropical storm and quickly communicate the risk of people who may be affected by the cyclone.

Remote sensing allows the observation of any object from a distance without actual contact. Remote sensing data can be obtained much faster than ground-based observations; can cover large area at once to give an overview of the process. Remote sensing comprises Aerial remote sensing, which is the process of recording information, such as photographs and pictures of aircraft sensors and remote sensing satellites, which consists of several remote sensing satellite systems that can be used to integrate the assessment natural risks in development planning studies. These are: Land Sat satellite SPOT Satellite Radar System, Radio Advanced Very High Resolution. Some applications of GIS and remote sensing in various disasters are:

4.1 DROUGHT

GIS and remote sensing can be used to manage drought relief, such as early warnings of drought can help plan strategies for organizing relief efforts. Satellite data can be used to target sites for potential groundwater programmers include well excavation. Satellite data provide valuable tools for evaluating areas subject to desertification. Slides, photographs and digital data can be used to locate, assess and monitor the deterioration of natural conditions in a given area.

4.2 EARTHQUAKE

GIS and remote sensing can be used to produce seismic hazard maps to determine the exact nature of the risks.

4.3 FLOODS

Satellite data can be effectively used for mapping and monitoring of flood inundated areas, flood damage assessment, flood hazard zoning and after the floods of the rivers of the survey work and protection settings.

4.4 LANDSLIDES

Zonation map [2] landslides include a map identifying the zone journeys or different degrees of slope stability or instability planned. The card has a built-in planning and therefore the probabilistic nature. Depending on the methods adopted and the versatility of the inputs used, a mapping of landslide hazard zonation able to provide assistance with the location, extent decanting area that may be affected, and the speed of the mass movement of the mass of the slope.

4.5 SEARCH AND RESCUE

GIS can be used to perform search and rescue operations in a more efficient by identifying areas that are prone to disasters and zoning sizes accordingly risk.

5 INTERNET

In the current era of electronic communication, the Internet provides a useful platform for disaster communications. Implementing a secure website is a very cost effective to make an intra-national presence felt worldwide. It offers a new and potentially revolutionary for the rapid dissemination, automatic and global disaster information. A number of individuals and groups, including several national meteorological services, are experimenting with the Internet in real-time dissemination of weather forecasts, satellite and other data. In the most critical phase of natural disasters electronic communication has the most effective and in some cases may be the only means of communication with the outside world.

6 WARNING AND FORECASTING SYSTEM

A feed system prediction, monitoring and issuing early warnings played the most important role in determining whether a physical danger or not reach catastrophic proportions. It has the following security systems:

6.1 INDIAN METEOROLOGICAL DEPARTMENT (IMD)

IMD's Area Cyclone Warning Center (ACWCs) has developed the necessary infrastructure to originate and disseminate cyclone warnings at appropriate levels. It has been the operating system of satellite communications Cyclone Warning Dissemination System for direct broadcasting cyclone warning cyclone-vulnerable coastal areas. IMD operationally running a limited area and Forecast Analysis System (LMIS), based on an optimal interpretation (OI) analysis and a limited area Primitive Equation (PE) to provide guidance numerical model.

6.2 NATIONAL REMOTE SENSING AGENCY (NRSA)

Long-term programs against drought on natural resources have been greatly aided by the use of satellite data obtained by the NRSA. Satellite data can be used very effectively for mapping and monitoring flood inundated areas, flood damage assessment, flood hazard zoning and previous flood study settings and river protection works.

6.3 SEISMOLOGICAL OBSERVATIONS

Seismological observations in the country are through the national network of 36 seismic stations operated by the IMD, which is the coordinating body. These stations have collected data for long periods.

6.4 WARNING SYSTEM FOR DROUGHT

The National Agricultural Drought Assessment and Management System (NADAMS) has been developed by the Department of Space for the Department of Agriculture and Cooperation, and is mainly based on the monitoring of vegetation status through the National Oceanic and Atmospheric Administration (NOAA) Advanced Very High Resolution (AVHR) data. Drought assessment is based on a comparative assessment of satellite observed vegetation (land and greenery) of a district in a given period, without corresponding period of the previous year.

6.5 FLOOD FORECASTING

Flood forecasts and warnings issued by the Central Water Commission (CWC), Ministry of Water Resources. These are used to alert the public and take appropriate action, as administrative or governmental technical agencies in mitigating flood risk. Network is gathered most stations CWC prediction of several rivers in the country.

6.6 CYCLONE TRACKING

Information about cyclone warnings are arranged in a real-time basis to the control room set up in the Ministry of Agriculture, Government of India. High power Cyclone Detection Radar (CDR), which is installed along the coastal belt of India has proved a useful tool for work cyclone warning [3]. These radars can locate and track tropical cyclones approaching a distance of 400 km. Satellite images from meteorological satellites are used extensively in the detection of the development and movement of tropical cyclones over oceanic regions, especially when they are away from coastal radars. The current mode of cyclone warning dissemination is to various officials through priority telegrams, telephone, telex and fax.

7 FINANCIAL ARRANGEMENTS FOR NATURAL DISASTER IN INDIA

Natural disasters are huge economic burden on developing economies like India. Every year huge amount of resources mobilized for rescue, relief and rehabilitation work after natural disasters events. The central government plays an important role in regard to the mobilization of financial resources is concerned. A system called Calamity Relief Fund (CRF) was created for each state, with contributions from the central and state government to carry out the relief and rehabilitation measures. This makes it possible for states to manage and provide disaster relief on your own using the resources available to a fund established for that purpose separately for each state. Besides CRF, a National Fund for Calamity Relief (NFCR) was created to address the severity of hazards administered by a National Committee for Disaster Relief (NCRC). State governments are required for this purpose notes provide information on the damage and destruction and the cost of relief and rehabilitation. Upon receipt of these notes, decide the Indian government on an individual if a core team is required to be appointed to assess the situation.

8 ADMINISTRATIVE STRUCTURE OF DISASTER MANAGEMENT IN INDIA

Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India, is the nodal department for all matters related to natural disaster mitigation at the Centre. The National Contingency Plan (CAP) facilitates the implementation of the relief and rescue operations immediately. There are various national committees for disaster management, such as the Committee of Ministers for the effective implementation of relief measures in the wake of natural disasters, the national crisis management committee headed nationally by the Cabinet Secretary which is responsible for various types of disasters and supporting ministries as members, Crisis Management Group reviews the different measures are needed to deal with a natural disaster, and coordinates the activities of the central ministries and state governments for emergency preparedness and disaster relief efforts and seek information from the nodal officers on measures relating to the above. Figure 1 shows the pattern of interaction in the government.

State governments are autonomous in organizing relief operations in case of natural disasters and long-term measures of emergency / rehabilitation. State Governments efforts are supplemented by the Center.

There is a crisis of the State Management Group (SCMC), under the chairmanship of Chief Secretary / Relief Commissioner to consider the infrastructure and guidance received from time to time by the Government of India and develop action plans to address to different natural disasters. There is statewide Control room set when a disaster situation develops.

States are divided into districts, each headed by the District Collector (also known as District Magistrate or the Deputy Commissioner), which is the focal point at the district level for the management, monitoring and corrective measures and disaster for the preparation of district level plans. The collector shall exercise powers of coordination and supervision of officials from all departments at the district level. Support measures are reviewed by the District Relief formed by official and unofficial members, including local legislators and members of parliament. A control room can be set up in the district to monitor the day-to-day relief and rescue operations continuously.

The Commissioner Collector / Deputy works closely with state authorities in the districts, namely, Army, Air Force, Navy, Department of Water Resources, etc., to complement the efforts of the district administration in rescue operation exercises . They also coordinate all efforts to mobilize volunteers for NGOs can work in those situations.

The country's armed forces have played a crucial role during disaster emergencies provides fast relief for victims, even in the most inaccessible and remote areas of the country. The organizational strength of the armed forces with its disciplined and systematic approach, and their skills in managing technical and human resources makes them indispensable for such emergencies.

India has a federal structure of integrated disaster management mechanism under the existing government.

9 CONCLUSION

Note that the growth of information technology in the area of Internet geographic information systems, remote sensing, satellite communications, and so on, so as to assist in the planning and implementation of the process of reducing the risks. To get the maximum benefit, in the case of new technologies in general contacts natural resources and mitigation messages must pass through these measures. Geographic information and the ability to improve the quality of evaluations and the analysis of natural hazards helps the relevant activities to assist planners in identifying and implementing measures to

alleviate the emergency preparedness and response. Remote sensing, however, as an effective tool to assist in identifying areas of risk, monitoring the planet to changes in real time, provide early warning future disasters

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